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NEW DATA ON SOME SPECIES OF THE GENUS
MICROMUS RAMBUR, 1842

(INSECTA: NEUROPTERA: HEMEROBIIDAE)

INTRODUCTION. The family Hemerobiidae is one of the most common in the Neuroptera and one of the more interesting economically as biological control agents. At present the family comprises 575 extant species belonging to 43 valid genera. Information on this family is still very incomplete and many species described on the basis of inadequate taxonomic characters need to be revised and redescribed, providing new characters, especially on genital morphology, which is definitive in their determination. Also, deficient typification of many species must be resolved and lectotypes should be designated. Finally, new material must be collected and studied to achieve a satisfactory level of knowledge on the distribution and biology of many poorly known species.

One of the most widely distributed and heterogeneous genera is *Micromus* Rambur, 1842. It includes 95 species, which, in many cases differ more widely among themselves than those in other hemerobid genera with a more clearly defined standard. Considering this, many genera have been described for different species (PERKINS, 1899, KRÜGER, 1922, NAKAHARA, 1960a etc.) in many cases without correlation between external and genital morphology, and later synonymized with *Micromus* (Tjeder, 1961). In the process this has caused enormous confusion in order to attempt a species grouping and a general systematic classification of this genus.

The genus has a nearly cosmopolitan distribution, including Europe, Asia, North America, Africa, Australia and many islands in the

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Indian, Atlantic and Pacific Oceans, while descriptions and citations from South America still need to be confirmed.

Since it was erected by Rambur, 1842, many authors have published interesting contributions (HAGEN, 1858, 1859, 1886, PERKINS, 1899, CARPENTER, 1940, ZIMMERMAN, 1957, NAKAHARA, 1960a, TJEDER, 1961, ASPÖCK et al., 1980, NEW, 1988a,b, KLIMASZEWSKI & KEVAN, 1988, MONSERRAT, 1990a etc.) giving an acceptable general level of knowledge of its species for the Palearctic, Nearctic, Australian or South African faunas.

However, a multitude of species have also been inadequately described or typified, frequently with little or no data on their morphology, venation or genitalia. The descriptions of these species must be reviewed and clarified so that a general revision of the genus can be made enabling valid criteria to be adopted for the adequate subgeneric grouping of its species. Once this is done it will be possible to study the taxonomy and systematics of this genus as well as its relationships with other close genera, like *Megalomina* Banks, 1909 or *Nusalala* Navás, 1913. On the other hand the existing data on variability, distribution and biology of many species are practically non-existent and new data are necessary to increase our knowledge of the genus, as well as to define the status of many taxa.

In this contribution, lectotypes and paralectotypes are designated for eight species and two genera and six species are proposed as new synonyms which are separately commented in the text if some question must be clarified. Eight poorly known species are redescribed and discussed, with particular emphasis on data from morphology, venation and genitalia that were previously unknown. Two new species are described from Indonesia and Papua New Guinea and new data are given on the geographical distribution and biology of other 38 species of this genus.

In this study I have followed the terminology of Tjeder, 1961 and the species are grouped in alphabetical order, a criterion that I prefer to follow until our knowledge of the *Micromus* species can be completed. The following is noted for each species: general geographical distribution, new data for typification that I have felt necessary to adopt, the proposal and discussion of new synonyms, data on their morphology, venation, and genitalia as well as the relationships of the studied specimens. Also provided are an indication of the country or island (in upper case), alphabetically arranged collection localities (in lower case)

with date of collection, number of ♂♂ and ♀♀, collector and any data on their biology noted on the labels as well as indicating their depositories according to the acronyms listed below:

(BM)	British Museum of Natural History (London).
(CAS)	College of Agricultural Sciences (Clemson).
(MCH)	Field Museum of Natural History (Chicago).
(MCZ)	Museum of Comparative Zoology (Cambridge).
(MG)	Museo Civico di Storia Naturale 'G. Doria' (Genova).
(MH)	Zoologisches Museum der Universität (Hamburg).
(ML)	Rijksmuseum van Natuurlijke Historie (Leiden).
(MZB)	Museu de Zoologia (Barcelona).
(MZH)	Zoological Museum of the University (Helsinki).
(TU)	Tel Aviv University (Tel - Aviv).
(VM)	Author's collection (Madrid).

STUDIED SPECIES

***Micromus angularis* (Perkins, 1899).**

Known from Hawaii.

Material examined: HAWAII: Lanai toward NE side 22.XI.1916 1♀ ex pupa G. Munro (BM).

***Micromus angulatus* (Stephens, 1835).**

A widely distributed Holarctic species.

Material examined: ALGERIA: Algeria 20.V.1895 1♀ Eaton (BM). CANADA: Labrador, SW Lake Melville, Kenemich Est., 7.IX.1958 1♂ S. Carter (BM), Kinriakak Point 19.VIII.1958 1♂ P.N. Lawrence (BM). Newfoundland, Lake St. John, NO 325, 27.VII.1951 1♀ Lindroth (MZH). W Ontario, Black Sturg. Lake 1-15.VIII.1956 1♀ Lindberg (MZH). FINLAND: Amur, Nikolajewsk 1.IX.1917 1♀ Y. Wuorentaus (MZH). Helsingē w.d. 1♂ Palmēn (BM). Irkutsk w.d. 2♂♂ Ahnger (MZH). Jakutsk w.d. 1♀ col.? (MZH). Jeniseisk w.d. 1♂ Wuorentaus (MZH). Krasnojarsk w.d. 3♀♀ Wuorentaus (MZH). Osnatjenn w.d. 1♀ K. Ehnberg (MZH). Tschimilkān, Lena Med. w.d. 1♂ B. Poppius (MZH). Ussuri, Spasskaja 18.IX.1917 1♂ Y. Wuorentaus (MZH). FRANCE: Corsica, Ajacato 9.V.1909 1♂ R. McLachlan (BM). Haute Garonne, St. Bēat 14-18.VII.1933 1♀ M.E. Mosely (BM). Pyrēnēes Orientales, Arles sur Tech 21.V.1961 1♀ D. & J. Clark (BM). Argeles, Taxo les Pins 12-26.VI.1983 1♂ 5♀♀ S. & A. Brooks (BM), 17-29.VI.1984 1♀ S. & A. Brooks (BM). IRAN: Sari 25.V.1986 1♀ col.? (BM). Teheran, Keredj 23.IV.1931 1♀ F. Brandt (MZH). ISRAEL: Bet Hillel 20.X.1984 1♂ Y. Zvik (TU). Herzliyya 16.VI.1981 1♀ Freidberg (TU). Tel Dan 8.XI.1984 1♀ Freidberg (TU). ITALY: Alpi, Piemonte w.d. 2♀♀ Ghiliani (MG). Dint. Kamno, Alto Isonzo XI.1915 1♀ A. Andreini (MG). Firenze, Granaielo 21.VIII.1936 1♀ Menozzi (MG). Isola S. Antonio 12.VII.1970 1♂ Poggi (MG). Is. Giglio IV.1901 1♀ G. Doria (MG), VIII.1901 1♀ G. Doria. (MG). Levico VIII-IX.1884 1♂, 1♀ G. Doria (MG). Lake Garda, Torri del Bannaco 16.IX.1980 1♀ S. & A. Brooks (BM). Piedicavallo, Val Cervo, Biella 8.IX.1954 2♂♂, 1♀ F. Capra (MG), VIII.1956 1♂, 1♀ F. Capra (MG). Piovera, Piemonte VIII.1932 2♀♀ G. Doria (MG), X.1932 1♂ G. Doria (MG). Ronco Cavanese, Piemonte 20.IX.1922 1♀ A. Dodero (MG). Sardegna, Carloforte 25.V.1912 1♂ A. Dodero (MG). Sasso Furbara, Roma VII.1935 1♀ S. Patrizi (MG). Valachie, Comana 1895 1♂ D. Montandon (MG). PORTUGAL: Alcobāça, Ganilhos 10.VII.1989 2♀♀ F. do Nascimento (VM). Madeira 5.VIII.1921 2♂♂, 4♀♀ Wollaston (BM). SPAIN: Madrid,

Alcalá de Henares 2.II.1987 1♀, at light M. Heykoop (VM). Santander, Cosgaya 2.VIII.1989 1♂ on *Corilus avellana*, A. Baz (VM). TURKEY: Constantinople XII.1923 1♀ J. Edwards (BM). UNITED KINGDOM: Berks, Maidenhead, Kimbers 3.VIII.1966 1♂ at light, B. Verdcourt (BM). USA: Mt. Washington w.d. 1♀ McLachlan (BM). USSR: Siberie Or., Maack w.d. 1♂, 1♀ col.? (BM).

Micromus angustipennis (Perkins, 1899).

This species is known from Hawaii, and shows a large variability in size, the females being normally much larger and the pigmentation of the immature specimens is faint.

Different specimens labelled as type of this species can be found in various collections: one female in the British Museum and a female and a specimen without hind wings nor abdomen (probably the male referred to in the description) in the Museum of Comparative Zoology. In his description Perkins, 1899 does not designate a holotype and I propose designating the BM specimen as lectotype and the remaining specimens in MCZ as paralectotypes.

Material examined: HAWAII: KAUI, Alakai Swamp, Kelekuia Hut 19.IX.1973 1♀ K. & E. Sattler (BM). Kokee 6.VII.1937 1♂ E.C. Zimmerman (BM), 11.VII.1937 2♀♀ E.C. Zimmerman (BM), 14.VII.1937 1♂, 1♀ E.C. Zimmerman (BM), 19.VII.1937 1♂ E.C. Zimmerman (BM). Kokee State Park, Halemanu 3.X.1973 2♂♂, 1♀ K. & E. Sattler (BM). Kaluapuhi Trail 9.VI.1982 1♂ K. & E. Sattler (BM). Kauaikiana 25.IX.1973 1♀ K. & E. Sattler (BM). Kaunuohua Ridge 6.IX.1973 1♀ K. & E. Sattler (BM). Kona For. Res., Alaki Swamp Trail 10.X.1973 1♂ K. & E. Sattler (BM). Kuhuamaa Flat 21.VIII.1973 1♂ K. & Sattler (BM). Kumuwela Ridge, Waininius Trail 24.VI.1982 1♂ K. & E. Sattler (BM). Nualolo Trail 4.X.1973 1♀ K. & E. Sattler (BM). Lihue Koloa F.R., Kanaele Swamp Trail 14.VII.1982 2♂♂ K. & E. Sattler (BM). Na Pali Kona Forest Res., Alakai Swamp Trail 29.VII.1982 1♂ K. & E. Sattler (BM). Mohihi Rd. 27.IX.1973 1♀ K. & E. Sattler (BM). Pihea Trail 14.IX.1973 1♀ K. & E. Sattler (BM), 10.VI.1982 1♂ K. & E. Sattler (BM), 21.VII.1982 1♀ K. & E. Sattler (BM). Nualob Val. VII 1952 1♂ D.E. Hardy (BM). Waimea 4000 ft, 1894 1♀ Perkins *Nesomicromus angustipennis* Perk. TYPE 9013 Hawaiian Islands R.C.L. Perkins 99.332 *Nesomicromus angustipennis* Perk. COTYPE (MCZ), VI.1894 1 specimen (♂?) R.C.L. Perkins *Nesomicromus angustipennis* Perk. TYPE 9013 (MCZ), VI.1894 1♂, 4♀♀ R.C.L. Perkins. (BM), VII.1896 1♀ R.C.L. Perkins *Nesomicromus angustipennis* TYPE (BM).

Micromus australis (Hagen, 1858).

This species is known from Sri Lanka and India, and I have also studied some specimens from Nepal. No holotype was designated by HAGEN, 1858 and eight specimens are labelled in different institutions as types for this species: they are probably the eight specimens cited by HAGEN, 1886. I designate as lectotype a male in the British Museum and I consider the other seven specimens from the Museum of Comparative Zoology as paralectotypes.

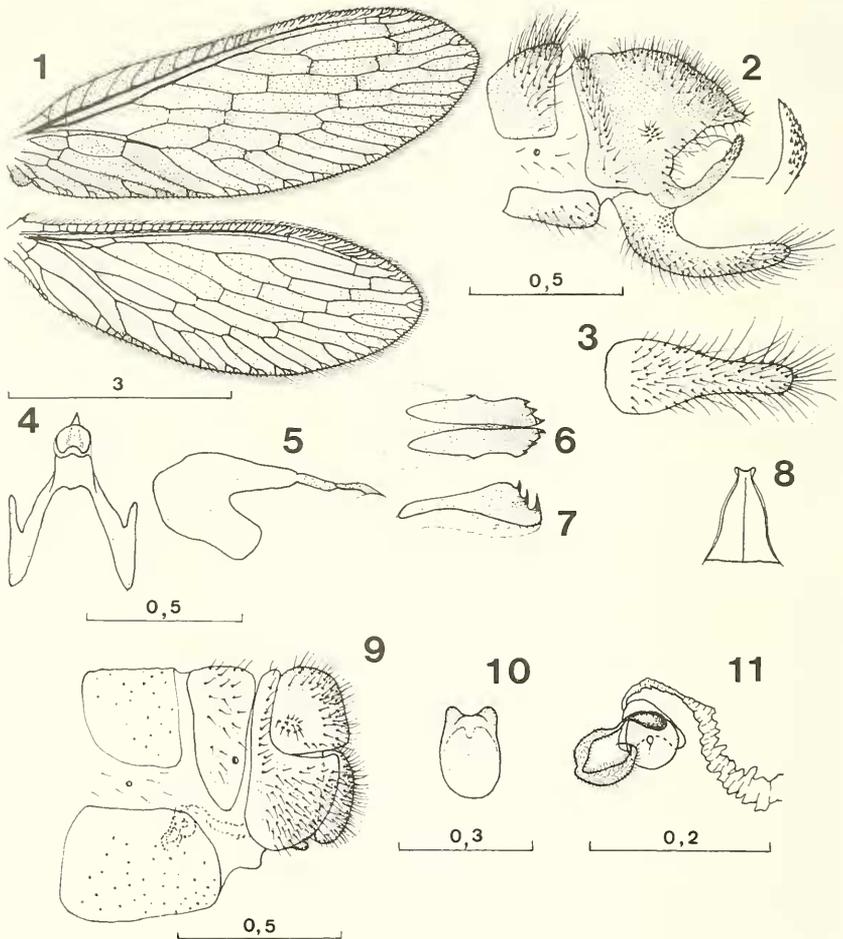
The morphology, venation and genitalia of this species are very poorly or even not known and it has rarely been recorded. An adequate redescription is made on the basis of the type series.

REDESCRIPTION – Brownish yellow tegument with blonde hairiness. Thoracic tergites laterally darker with a pale central band. Some specimens possess two darker circular spots on the pronotum. Legs pale, without dark spots.

Wing venation and pigmentation as in figure 1. Forewings veins are a uniform brown. Membrane is uniformly pale brown, darker in the jugal lobe, anal and cubital regions and slightly over the gradates (Fig. 1). Pterostigma indistinct. Hindwings have a paler venation and membrane, only the cubital region is darker at margin. Pterostigma indistinct.

Male: Rectangular tergites, I-V barely hairy, VI-VIII densely covered with setae. Sternites transverse. Pleurae with setae. IX tergites separated into two pieces by a narrow mid dorsal divisory line, the antecosta barely extends forward (Fig. 2). Sternite IX narrow, digitiform and strongly bent upwards, the dorsal region lacks setae and its base is heavily granulated (Figs. 2,3). Ectoproct subtriangular (Fig. 2), the surface is crossed by a groove separating the anoproct from the rest. Its superior margin is convex in lateral view and the internal mid margin is also convex. The cercal callus has 11-12 trichobothria. The anoproct is curved towards the mid line, and carries denticles into which the setae fit. The catoproct is basally bent and directed toward the mid line without crossing it while its apex bears robust denticles on the external face (Fig. 2). Gonarcus tenuous, the anterior margin is an open U shape and it caudally lengthens into a square process that serves as base to the arcessus articulation (Fig. 4). The basal portion of the arcessus is circular and the apical part ends in one or two denticles (Fig. 4). Parameres wide, with a variable number of apical denticles (Figs. 6,7). Hypandrium narrow and has sinuous lateral margins (Fig. 8).

Female: Sternite VII is wide with a convex caudal margin. Tergite VIII is wide and subtriangular. Tergite IX usual. The ectoproct is square with a convex caudal margin. The cercal callus bears 13-14 trichobothria. The lateral gonapophyses are proportionally small (Fig. 9). The subgenital plate is square, with a slightly bilobulate caudal



M. australis (Hagen, 1858).

Fig. 1-11 - 1. Wings; 2. Apex of abdomen ♂, lateral view. Apex of catoprocessus in dorsal view magnified; 3. IX sternite, ventral view; 4. Gonarcus - arcesus, dorsal view; 5. Same, lateral view; 6. Parameres, dorsal view; 7. Same, lateral view; 8. Hypandrium, dorsal view; 9. Apex of abdomen ♀, lateral view; 10. Subgenitale plate, ventral view; 11. Spermatheca, lateral view. (2-8: Lectotype, 1,9-11: Paralectotype). Scale in mm.

margin (Fig. 10). A membranous formation is associated with it, which is slightly sclerotized and has ill defined borders. The spermatheca has a poorly sclerotized hairy process and is followed by a duct which is heavily sclerotized proximally. The duct curves in a triple helix and

ends in a sinuous membranous duct that is associated with the subgenital plate and adjoining structures.

Once the morphology of this species was known, its immediate association with *Mixomicromus lampus* Ghosh, 1977 became obvious. This species has been described from India and, although I have not yet been able to study the type, its author gave me his opinion about both species remarking that they could be distinguished on the basis on some characters in the fusion of parameres, shape and orientation of gonarcus, curvature of apex of the arcessus or shape of spermatheca. However, I think that these characters are very variable in most *Micromus* species and its morphology is identical to that of the species just redescribed. No existing arguments maintain the validity of the genus *Mixomicromus* created by GHOSH, 1977 for this species since it fits the description of *Micromus* and some of their species shown the characteristics of the generic diagnosis.

The following synonymies are proposed:

Micromus Rambur, 1842

= *Mixomicromus* Ghosh, 1977: 235 **n. syn.**

Micromus australis (Hagen, 1858)

= *Mixomicromus lampus* Ghosh, 1977: 235 **n. syn.**

Material examined: INDIA: Ayur, North Salem 7.I.1931 1♂ F.R.I. Sandal (MCZ). Jawalagiri, North Salem 26.XI.1930 1♂ F.R.I. Sandal (MCZ). Kerala Palode I.1985 1♂ (CIE) 16964 on areconut palm leaves (BM). Walayan Forest, S. Malabar 2000 ft, 28.VIII 1♀ P.S. Nathan (MCZ). NEPAL: Les Jessop w.d. 1♂, 1♀ col.? (BM). SRI LANKA: Ceylon w.d. 1♂ Nietner TYPE 10444 Hagen (MCZ), 5♀♀ Nietner TYPE 10444 Hagen (MCZ), 1♀ Nietner *Micromus australis* Hagen TYPE 10444 (MCZ), 1♂ Nietner *Micromus australis* Hagen TYPE (BM), 1♂ Nietner (MCZ). Lewis w.d. 1♀ MacLachlan (BM). Madulsima 27.IX.1907 1♀ T.B. Fetcher (BM).

***Micromus bellulus* (Perkins, 1899).**

This species is known from Hawaii.

In his description Perkins, 1899 refers to four specimens but he does not designate a holotype. I have studied two syntypes of the type series: 1♂ and 1♀ labelled as type for this species, but I do not know where the other specimens are. I propose designating the male specimen studied as the lectotype for this species and the other as paralectotype.

Material examined: HAWAII: MAUI, Haleakala, 5000 ft, III.1894 1♂ R.C. Perkins *Nesomicromus bellulus* TYPE (BM), III.1894 1♀ R.C. Perkins *Nesomicromus*

bellulus TYPE (BM), X.1896 1♀ R.C. Perkins *Nesomicromus infumatus* TYPE (BM). OAHU, Waianne Mts., 3000 ft, II.1896 1♀ R.C. Perkins *Nesomicromus minor* TYPE (BM). Waianae Range, Mt. Kaala 4000 ft, 4.IX.1976 1♀ K. & E. Sattler (BM). MOLOKAI, Molokai Mts. 4000 ft, VI.1893 1♀ R.C. Perkins *Nesomicromus molokaiensis* TYPE (BM).

Micromus bifasciatus Tillyard, 1923.

Known from New Zealand.

Material examined: NEW ZEALAND: Makara Bush w.d. 2♂♂, 1♀ G.V. Hudson (BM), 5.XII.1922 1♂ G.V. Hudson (BM), 17.IV.1924 1♂ G.V. Hudson (BM), 3.VIII.1929 1♀ G.V. Hudson (BM), 16.I.1930 1♂, 1♀ G.V. Hudson (BM), 25.I.1936 1♂, 1♀ G.V. Hudson (BM). Ohakune V-VII.1923 1♂ T.R. Harris (BM). Titirangi 20.IX.1916 1♀ A.E. Brookes (BM). Wellington, Makara Bush w.d. 2♂♂, 2♀♀ G.V. Hudson (BM).

Micromus borealis Klimaszewski & Kevan, 1988.

A northwestern Nearctic species not recorded in USA.

Material examined: USA: Colorado, Maysville 23.VIII.1945 1♀ H. Ramstadt (MCH).

Micromus brunnescens (Perkins, 1899).

Known from Hawaii.

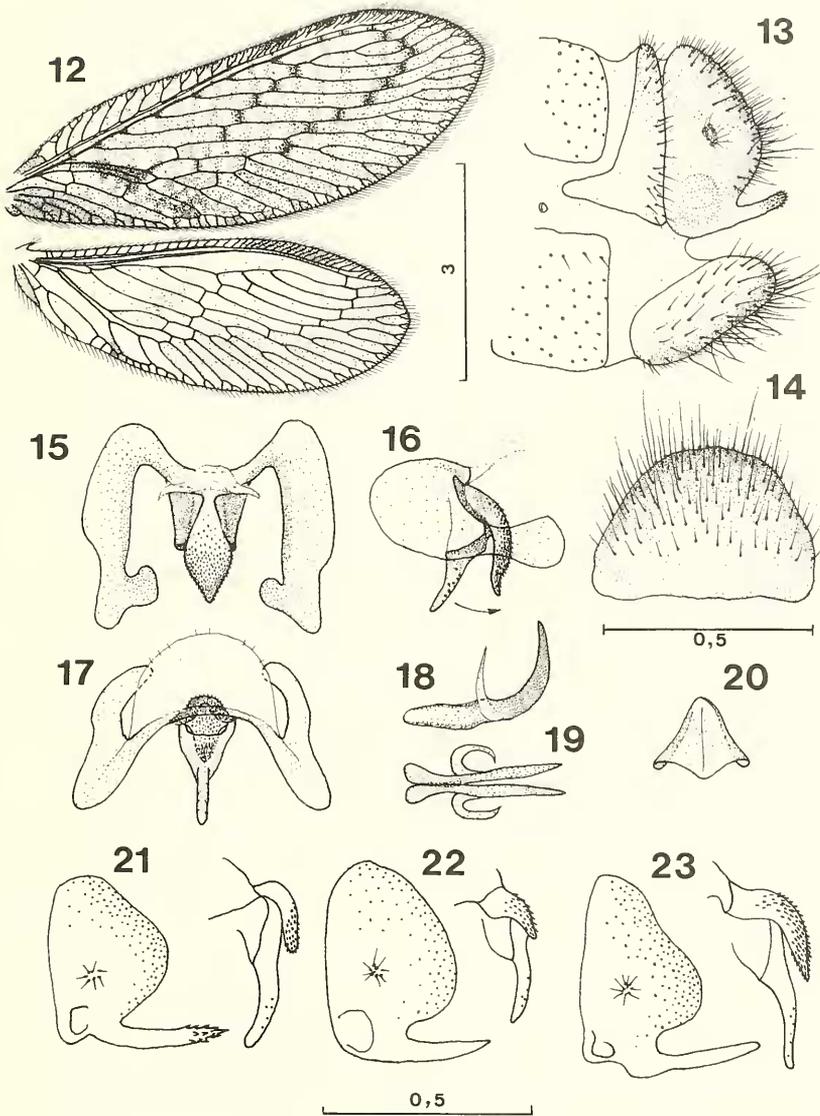
Material examined: MAUI, Olinda 13.V.1926 1♂ Swezey (BM). MOLOKAI, above Waikolu Vol. 28.IV.1955 1♂, 1♀ E.J. Ford (BM). LANAI, Mts. Koele 2000 ft, I.1894 1♂ R.C. Perkins (BM), Lanaihala I.X.1976 1♀ K. & E. Sattler (BM). Molokai Mts, 3000 ft, VI.1893 1♂ R.C. Perkins *Nesomicromus brunnescens* TYPE (BM), 4000 ft, VIII.1893 1♀ R.C. Perkins (BM).

Micromus calidus Hagen, 1859.

Until now this species was known from Sri Lanka and India. However, on the basis of the data studied here, it is widely distributed through Malaysia and the Philippines in the Oriental Region as far as Japan.

No type was designated by HAGEN, 1859 and the type series of this species comprises four syntypes, 1 male and 3 females. I designate the male specimen as lectotype for this species and the other specimens as paralectotypes.

The morphology of this species is poorly known although much data can be obtained from its synonymous species, particularly the ones that are proposed here as new synonymies. However, it is important to



M. calidus Hagen, 1859.

Figg. 12-23 - 12. Wings; 13. Apex of abdomen ♂, lateral view. 14. IX sternite, ventral view; 15. Gonarcus - Mediuncus - Arcessus complex, dorso caudal view; 16. Same, lateral view; 17. Same, antero dorsal view; 18. Parameres, lateral view; 19. Same, antero dorsal view; 20. Hypandrium, ventral view; 21. Ectoproct and Mediuncus - Arcessus in lateral view of a specimen from Chautara (Nepal); 22. Same from Sarawak (Malaysia); 23. Same from United Provinces (India). (12: paralectotype, 13-20: lectotype). Scale in mm.

note the characteristics of the type series here, before discussing the species variability on the basis of the remaining studied material.

REDESCRIPTION – Head dark brown with blonde setae. Anterior region with two brown spots on either side of the clypeus and two very shiny triangular brown spots over the genae (Figs. 28, 29). Head and vertex have dark brown spots that are distributed differently in the different specimens (Figs. 24-29). Palps brown, the scape and pedicel are darker brown than the flagellum, the dorsal region of the scape of some paralectotypes is darker externally and internally (Fig. 28).

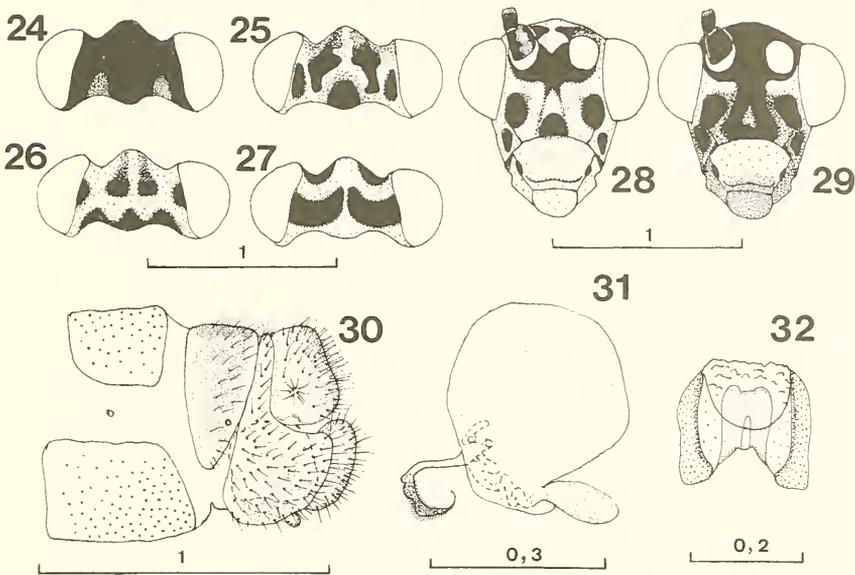
Thorax has very dark brown tergites with blonde setae. A pale mid-line band can be seen in some paralectotypes. Legs brown with darker spots situated as follows: L1 on the basal and distal regions of the coxa and the basal, preapical and central regions of the femur and the tibia, L2 all of the coxa and trochanter and central and apical region of the femur and central, preapical and basal region of the tibia, L3 (lacking in the lectotype) in coxa and trochanter, dorsal femur and basal, apical and central tibia. Distal end of the tarsomeres are darker.

Wing venation and pigmentation as in Fig. 12. Forewings brown, with brown stripes on longitudinal veins C, Sc and R, longer than those of the other longitudinal veins. The proximal parts of MP, CUA and external and internal gradiform veins (except for the penultimate basal vein of both series which are hyaline) are a darker brown. The beginning of CUP and the CUA-MP fusion are hyaline. The membrane is variegated brown, which is more intense in the marginal region, where it forms small stripes, close to the gradiforms, the anal region and particularly between MP-CUA where there is a characteristic brown stripe (Fig. 12). Pterostigma indistinct.

Hindwings with pale brown venation, except for pterostigma, CUA, the external gradates and the veins located between these and the wing margin, which are darker brown. The membrane is hyaline except in the proximity of the above mentioned veins, the CU-A margin and the anal lobe, where it is brown (Fig. 12). Pterostigma dark brown.

Male (lectotype): Tergites and sternites are rectangular with a well delimited antecosta. Tergite IX dorsally subdivided into two subtriangular pieces with an antecosta that extends into a triangular process (Fig. 13). Ectoproct ovoid with a very convex caudal margin bearing a membranous process on the antero-inferior angle (Fig. 13). The catoprocessus is subcylindrical, blunt and curves slightly inwards

and upwards, with a more sclerotized apex which bears small denticules (Fig. 13). The cercal callus has 16 trichobotria. Sternite IX trapezoidal (Fig. 14) with a rounded caudal margin. The gonarcus is narrow with a U-shaped anterior incision, the caudal margin extends into a semicircular membrane (Fig. 17). The mediuncus and arcessus probably fold over the gonarcus, the mediuncus is rhomboid in caudal view (Fig. 15) and arched in lateral view (Fig. 16), it is heavily sclerotized and bears many irregularly distributed denticules (Figs. 15,16). Anteriorly the mediuncus fuses with the arcessus, which is subtriangular, and basally broader with a blunt subcylindrical apex which bears caudal sensorial denticules (Figs. 16,17). The parameres fuse anteriorly, and are more sclerotized caudally where they curve upwards lengthening into two caudal formations with a membranous appearance (Figs. 18,19). Hypandrium triangular (Fig. 20).



M. calidus Hagen, 1859.

Fig. 24-32 - 24. Head in dorsal view of a specimen from Sri Lanka; 25. Same from Sri Lanka; 26-27. Same from India; 28. Head in anterior view of a specimen from Sri Lanka; 29. Same of a specimen from Sri Lanka; 30. Apex of abdomen ♀, lateral view.; 31. Spermatheca, subgenital plate and associated structures, lateral view.; 32. Subgenital plate and associated structures, ventral view. (24, 29: lectotype, 25,28,30-32: paralectotypes). Scale in mm.

Female (paralectotypes): Tergite VII and sternites transverse, the former proportionately narrow (Fig. 30). The caudal margin of the VII sternite slightly convex. The unpaired VIII tergite is subtriangular in lateral view, and has weakly sclerotized anterior and posterior margins. IX tergite narrow, the inferior region ovoid, with ventral margins bent toward the mid-line. Ectoproct ovoid, the antero-ventral angle is less sclerotized. Cercal callus with 20-21 trichobothria. The lateral gonapophyses are elliptical and small (Fig. 30). Subgenital plate spatulated with a middle longitudinal incision (Fig. 32). This plate is associated with an internal structure with a globose appearance in lateral view and square in ventral view (Figs. 31,32). The spermatheca is bent, sclerotized and very hairy at its distal end (Fig. 31).

The specimens of the type series, even the ones that were captured at the same site, present a high degree of variability in tegument and wing coloration, in both number and distribution of spots. On the contrary, the legs seem to maintain a constant coloration and the wing venation is also uniform, as shown in Fig. 12, and the longitudinal groove between MP and CUA is characteristic.

On the male genitalia, within a general scheme, the parameres, the X sternite, hypandrium width and the form of the ectoproct and catoprocessus vary in the different specimens studied (Figs. 21-23). The mediuncus and the arcessus also differ, with a tendency for reduction of the mediuncus and fusion with the dorsal arcessus region in the more easterly specimens (Figs. 21-23).

Female genitalia vary little in their external appearance, subgenital plate and spermatheca, but the form and degree of sclerotization of the associated internal structures is very variable, and become striped in the specimens from Japan.

Given the morphology and variability of this species, two new synonymies are proposed:

Micromus calidus Hagen, 1859

= *Eumicromus maculatipes* Nakahara, 1915: 39 **n. syn.**

= *Micromus pictipes* Banks, 1920: 334 **n. syn.**

Both species have already been suggested as possible synonyms (NAKAHARA, 1966).

Material examined: INDIA: Khasis w.d. 1♀ MacLachlan (BM). Shembaganur, nr. Kodaikanal, 6000 ft, 30.III.1936 1♂ B.M. exp. S. India (BM). Simla V.1977 1♀ P. Saxena ex *Myzus persicae* (BM). United Provinces, Nainj Tal 25.II.1934

1 ♀ J.A. Graham (BM). JAPAN: Hiraoka Koen, Osaka 22.XII.1984 1 ♂ S. Tsukaguchi (VM). Mt. Mayasan, Kobe, Hyogo, Honshu 2.IX.1977 1 ♀ S. Tsukaguchi (VM). MALAYSIA: Sarawak, Foot Mt. Dulit, junction of rivers Tinjar & Lejok 25.VIII.1932 1 ♂ Oxford Univ. Exp. (BM). NEPAL: Chautara Distr., Nauling Lekh. 11-20.VI.1983 1 ♂ A. Brendell (BM). PHILIPPINES: Baguio, Benguet w.d. 1 ♀ Baker *Micromus pictipes* Banks TYPE 10833 (MCZ). SRI LANKA: Ceylon w.d. 1 ♂, 3 ♀♀ Nietner *Micromus calidus* Hagen TYPE 10443 (MCZ). Uva, P. Madulsina 4500 ft, 14.VIII.1908 1 ♀ T.B. Fletcher (BM).

***Micromus distinctus* (Perkins, 1899).**

Known from Hawaii.

Material examined: HAWAII: LANAI, Lanaihale I.X.1976 1 ♀ K. & E. Sattler (BM). Munro Trail 2.X.1976 1 specimen without abdomen K. & E. Sattler (BM). MAUI, Forest Res., Kaulaleweleve, Puu Kukui Trail 3000 ft, 24-27.VIII.1976 2 ♀♀ K. & E. Sattler (BM). MOLOKAI, Molokai Mts. VIII.1893 1 ♀ R.C. Perkins *Nesomicromus distinctus* TYPE (BM).

***Micromus drepanoides* (Perkins, 1899).**

This species is known in Hawaii, and I have observed a great deal of variability in wing size and pigmentation as well as in the form of the male ectoproct.

Material examined: HAWAII: KAUAI, Kamumela 27.VI.1932 1 ♀ O.M. Swerey. Kaunuohua Ridge 21.VII.1937 1 ♂ E.C. Zimmerman, 30.VIII.1973 1 ♂ K. & E. Sattler. Kokee State Park, Halemanu 3.X.1973 2 ♂♂, 2 ♀♀ K. & E. Sattler. Honopu Trail 22.VIII.1973 1 ♂ K. & E. Sattler. Na Pali Kona F.R., Miloi Ridge 26.V.1982 1 ♀ K. & E. Sattler. Nualolo Val., VII.1951 1 ♀ D.E. Hardy, VII.1952 1 ♂ D.E. Hardy. Waialeale Valley 7.X.1973 2 ♂♂ K. & E. Sattler. Waialeale VIII.1953 1 ♀ D.E. Hardy. Waimea 4000 ft, 1894 1 ♀ R.C. Perkins, 1896 1 ♂ R.C. Perkins *Nesomicromus drepanoides* Perk. TYPE. All of the BM.

***Micromus falcatus* (Zimmerman, 1957).**

Known from Hawaii.

The paratype of this species and the right wings of the holotype are in the British Museum but the rest of the holotype has not been located.

Material examined: HAWAII: OAHU, Honolulu Mt., 1000 ft., XII, right wings on slide, R.C.L. Perkins *Nesomicromus falcatus* E.C. Zimmerman HOLOTYPE (BM). Opaepala 30.III.1913 1 ♂ O.H.S. *Nesomicromus falcatus* E.C. Zimmerman PARATYPE (BM).

***Micromus fanfai* n. sp.**

Material examined: PAPUA NEW GUINEA: Mafulu 4000 ft, XII.1933 1 ♂ L.E. Cheesman (BM) 1934-321, pinned and identified as *M. timidus*, HOLOTYPE (BM).

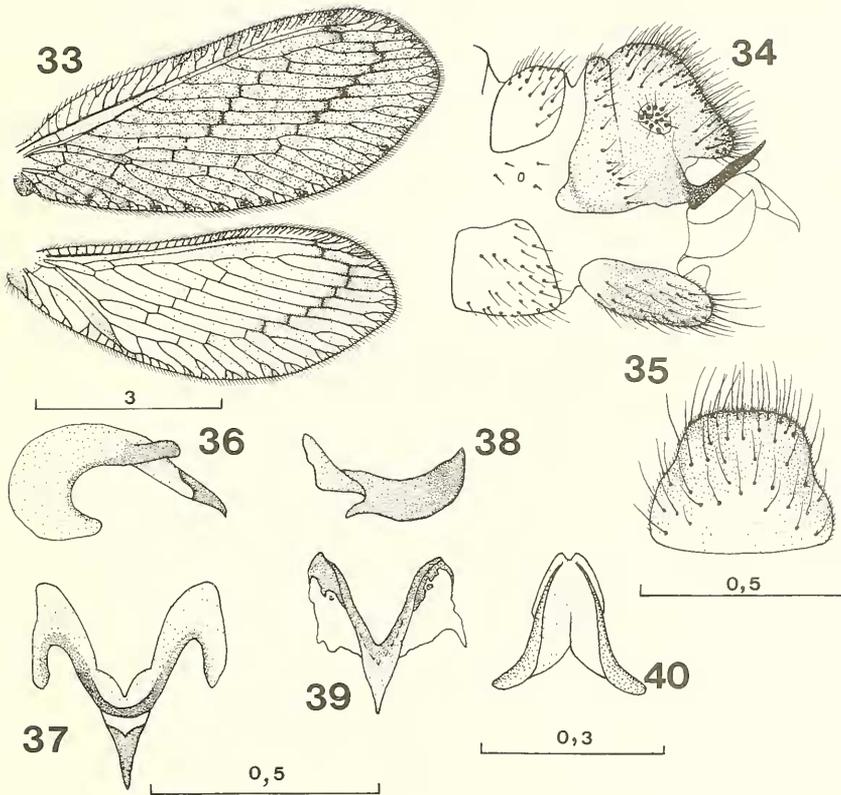
DESCRIPTION — Head pale brown, darker and shinier laterally between the eyes and mouth parts. Vertex pale brown with a brown

stripe over the posterior margin of the toruli. There are also two small stripes over the mid-line front between the bases of the antennae. The escape and pedicel are brown, the flagellum is brown but the 6th to 11th segments are darker. Palpi brown.

Pronotum pale brown with a dark brown narrow stripe on mid line, and a wide dark brown band on the lateral zone. The meso and metanotum are pale brown with a wide dark brown band on the lateral zone. The brown legs have black spots situated as follows: L1 on the mid zone of the coxa, femur darker in the dorsal zone, tibia has a spot between the 1st and 2nd third and another more marked one between the 2nd and 3rd third of its length. On L2, the dorsal region of femur is darker, tibia has a spot between the 1st and 2nd third and a much more marked and bigger one between the 2nd and 3rd third of its length, completely surrounding the tibia in this zone. In the L3 the dorsal surface of the femur and the distal end of tibia are also darker. The last two tarsomeres of all the legs are darker.

Wings wide with venation and pigmentation as in Fig. 33. The membrane of the forewings is pale brown, the surface is irregularly variegated with V-shaped spots that are aligned on the cubital and anal fields. Darker over the costal, the gradates, the lower fork of media and the jugum. Venation is pale brown, and darker in the above mentioned zones where the membrane is browner. The SC, R and longitudinal veins are striped. Pterostigma indistinct. Hind wings with a pale membrane and only the prepterostigmatic region, external gradates and extreme of the CU-A are shaded with brown. The venation is pale brown except for SC, C, R in the prepterostigmatic area, and external gradates where it is darker.

Male tergites square, with irregular margins, which are caudally notched in the anterior segments and progressively less marked in the more caudal segments. Tergite VIII narrow. Sternites are wide and rectangular, the antecosta is heavily marked in tergites I-V. Sternite IX trapezoidal in ventral view, and the basal setae are so prominent as to appear to be denticules (Fig. 35). Tergite IX not fused in the dorsal region, each lateral piece is narrow dorsally and loses its individuality to fuse with the ectoproct when it becomes more ventral (Fig. 34), antecosta blunt and thick. Ectoproct not fused in the dorsal region, triangular in the lateral view, the caudal apex is blunt and very pronounced, the ventral region is strongly sclerotized and forms a base



M. fanfai n. sp. ♂.

Figgs. 33-40 - 33. Wings; 34. Apex of abdomen, lateral view; 35. IX sternite, ventral view; 36. Gonarcus - Arcessus, lateral view; 37. Same, dorsal view; 38. Parameres, lateral view; 39. Same, dorsal view; 40. Hypandrium, ventral view. Scale in mm.

for the long, thin, and somewhat sinuous catoprocessus which points upward and inward (Fig. 34). Cercal callus has 15-16 trichobothria. Gonarcus narrow and very arched (Fig. 36), the internal superior margin is V-shaped (Fig. 37) with two small caudal prolongations. The mediuncus has a heavily sclerotized border. The arcessus is subconical, slightly arched downward at its end (Figs. 36,37). Parameres thick and upwardly curved, their caudal region is an open V-shape which is

heavily sclerotized on the internal face and associated with membranes on the external face (Figs. 38,39). Hypandrium triangular, very flat with lateral borders in the caudal region (Fig. 40).

The female is unknown.

DISCUSSION – The New Guinean Hemerobiidae have recently been studied by NEW (1988b), who noted the presence of four species of this genus on the island.

The wing structure presented by *M. fanfai* n. sp. is very different from that of *M. loriamus* (Navás, 1929) and *M. brandti* New, 1988 whose wings have a very different size, and are much narrower and more pointed and their venation, particularly in the Cu and A fields of both wings, is markedly different from that of *M. fanfai* n. sp. Other characteristics, like the tegumentary colour and the genitalia are also different.

The wings of *M. timidus* Hagen, 1853 are somewhat wider, but do not reach the dimensions of *M. fanfai*, although their venation and colour are very similar. Nevertheless, tegumentary colour, male genitalia, in particular the form of the IX sternite, the ectoproct and its catoprocessus, and the lack of a paired entoprocessus in the *M. fanfai* gonarcus differentiate both clearly, despite the margin of variability in *M. timidus* (TJEDER, 1961).

The venation of the last species cited by NEW, 1988b as *Micromus* sp. is like that of *M. fanfai*, but it would be difficult to associate them due to their tegumentary and wing colour as reported by that author.

With regard to the other species from the Australian Region and the southern Pacific islands, *M. fanfai* is differentiated by its colour, venation and male genitalia and is easy to distinguish from *M. tasmaniae* (Walker, 1860), *M. bifasciatus* Tillyard, 1923 and *M. marquesanus* (Kimmins, 1932). Due to the appearance of its wings, *M. fanfai* is doubtlessly a species close to *M. neocaledonicus* (Nakahara, 1960), although the external margin of forewings is straighter, the membrane is less pigmented and legs are pale and unspotted (NAKAHARA, 1960b). This species is known from one female and there are no data on its male genitalia.

With regard to the male genitalia of the Asiatic species, *M. fanfai* differs in many characteristic while the males of other species are unknown, and their status is still to be defined although their relation

with this new species is unlikely on the basis of the known morphological data.

I dedicate this new species to Fernando Rodrigo in admiration and recognition of his painting work and in gratitude of the friendship I believed, united us.

Micromus gradatus Navás, 1912.

Endemic to Corsica.

Material examined: FRANCE: Corsica, Vizzavona 25.VIII 1♀ Krause (MCZ).

Micromus gratus Banks, 1937.

This species was been described from the Philippines and not subsequently recorded. The identity and relation with other species described from this region, such as *M. nigrifrons* Banks, 1937 and *M. placidus* Banks, 1937, cannot be defined until male specimens are known.

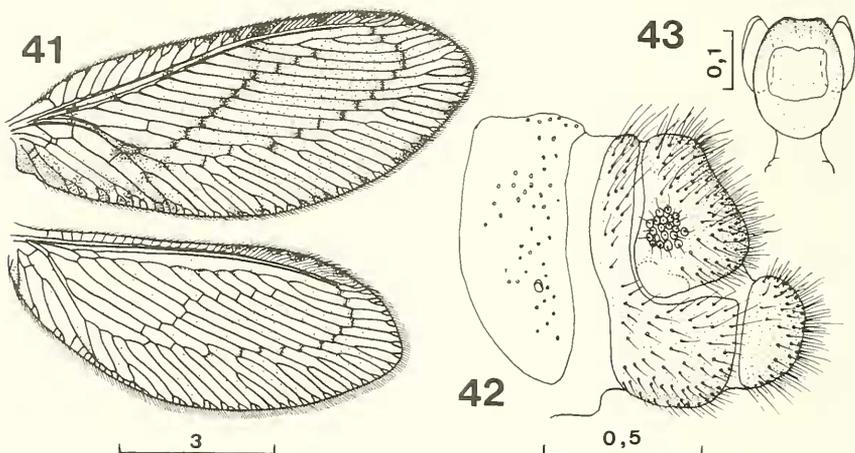
On the basis of the only available specimen for this species I give new data on its morphology, venation and genitalia.

REDESCRIPTION – Head dark brown, the incomplete antennae, are somewhat paler than the head. The brown thorax has shiny blonde hairiness. On L1 and L2, the femur is dark brown dorsally and the tibia has three brown spots, one over the ends of its basal third and the other two at the end of the distal third. The L3 with trocanter brownish black, the same as the dorsal region of the femur, the tibia has two very dark spots on the ends of its distal third.

Wings iridescent, with lightly marked pterostigma and the venation and pigmentaton as in Fig. 41. The forewings have pale brown membrane that is darker in the anal region, the CuA fork and in the gradates, particularly the internal ones. The costal and its adjoining membrane are lightly and darkly striped in an irregular manner. Vein R also has irregularly placed brown bands, which are darker below the first transverse subcostal vein. The transverse veins are brown, but the two basal external gradates are not. Hindwings somewhat more pale. The venation is brown and a bit darker in the external gradates, the Sc, R and medial radial sectors. In these zones and in the joining of the anal and cubital fields the membrane is darker.

Abdomen dark brown with shiny blond setae. Tergite VIII wide, the IX tergite narrow and sinuous, separated dorsally over the midline, with a square ventral region with a marked superior corner (Fig. 42). The ectoproct has rounded corners, the interior one is barely sclerotized (Fig. 42). Cercal callus with 20-23 trichobothria. Lateral gonapophysis proportionally small. The subgenital plate (Fig. 43) is ovoid, lightly sclerotized and associated with a cone-shaped anterior membranous formation. The spermateca was not found.

Material examined: PHILIPPINES: MINDANAO, Mt. Apo, Tia Ridge, 6500 ft, IX 1♀ C.F. Clagg *Micromus* (*Archaeomicromus*) *gratus* Bks, TYPE, MCZ Type 20207 (MCZ).



M. gratus Banks, 1937. Holotype ♀.

Figg. 41-43 - 41. Wings; 42. Apex of abdomen, lateral view. 43. Subgenital plate, ventral view. Scale in mm.

Micromus haleakalae (Perkins, 1899)

This is the same name for two hawaiian species described by PERKINS, 1899 in different genera. One was originally described as *Nesomicromus haleakalae* and the other as *Nesothauma haleakalae*. According to TJEDER, 1961 both genera are synonyms of *Micromus*.

When transferred to the valid genus, they were seen to be different species with the same name (MONSERRAT, 1990b). To resolve this

homonymy, I propose the name *M. vulcanius* for the species formerly called *Nesothauma haleakalae*.

Micromus vulcanius n. n. for *Nesothauma haleakalae* Perkins, 1899: 47.

Micromus igorotus Banks, 1920.

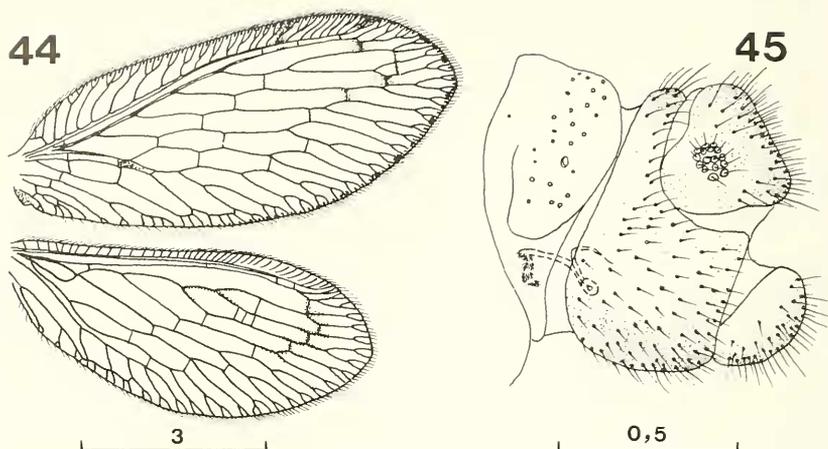
The species was described by BANKS, 1920 from the Philippines without sufficient morphological data, on the basis of female specimens. Later, ESBEN-PETERSEN (1926, 1929) and BANKS (1937) recorded the species and little data has been added to its morphology but its known geographical distribution has been substantially extended. Also, NAKAHARA (1956) described *Eumicromus okinawamus* from the Island of Okinawa, also on the basis of a female. This species became a synonym of *M. igorotus* in NAKAHARA'S (1960a) opinion and he transferred it to the genus *Pseudomicromus* Krüger, 1922, providing schematic data on the male genital morphology. Since the synonym was accepted (NAKAHARA & KUWAYAMA, 1961, KUWAYAMA, 1964, MONSERRAT, 1990b, etc.) the species is known from Philippines, Ryukyu, Taiwan, Thailand and Indonesia, and now is also recorded from China.

On the basis of the study of new material and the type series, I give new data on the external morphology, the wings and the genitalia, both male and female.

REDESCRIPTION – Head brown, darker behind the eyes, vertex paler. Labial palps dark brown, maxillary palps paler. Antenna pale brown with blonde setae. Scape subconical, flattened dorsoventrally. Pedicel small.

Thorax dark brown with blonde setae and with a wide pale brown strip. Legs 1 and 2 with coxa, trochanter and femur pale brown, tibia with two brown dark spots on its anterior face and at both sides of the 2nd and 4th fifth portion of its length. L3 pale brown without spots.

Wings of lectotype as Fig. 44, and of specimen from China as in Fig. 46. General colour brown, paler the hind wings. Forewings with costal irregularly striped with brown, but also longer on longitudinal veins. First costal veinlet almost recurrent and some specimens with costal crossveins. First subcostal veinlet pale. External gradates and adjacent veins dark brown, internal paler. Membrane darker in those zones and in the MP fork. Anal and cubital fields with dark oblique



M. igorotus Banks, 1920.

Figg. 44-45 - 44. Wings; 45. Apex of abdomen ♀, lateral view. (44. lectotype, 45: paralectotype). Scale in mm.

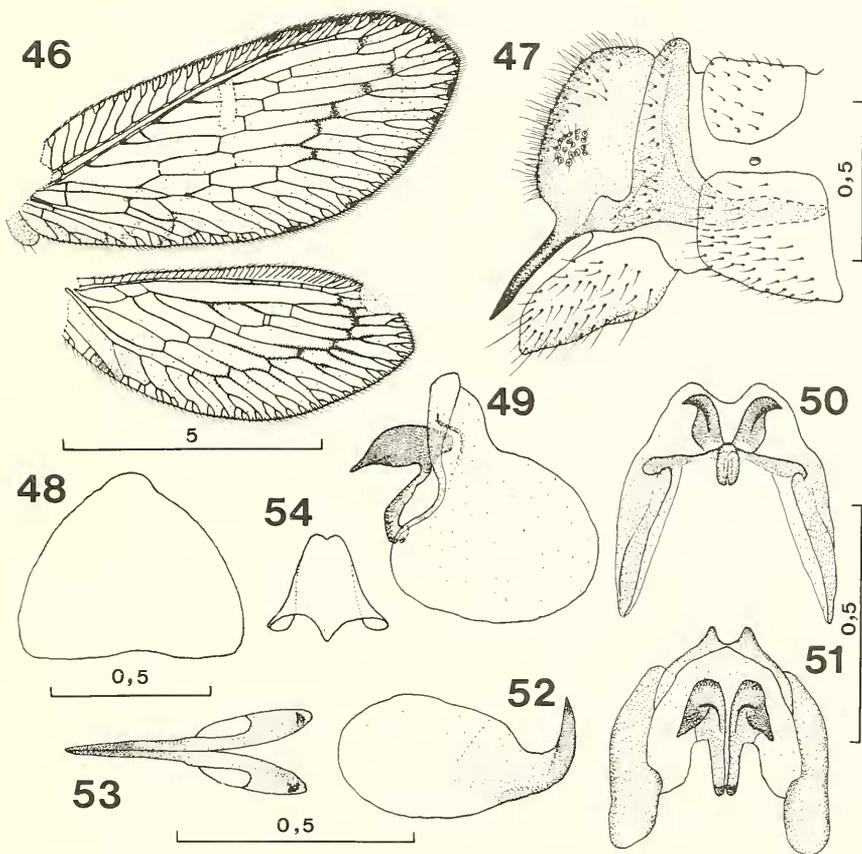
stripes. Pterostigma indistinct. Hind wings with venation yellow brown, but basal half of C, prepterostigmatic Sc & R, beginning of RS, CuP and external gradates are darker and the proximal membrane is browner. Some inner gradates duplicated. Pterostigma indistinct.

Male: Tergites and sternites rectangular. Tergite IX fused on dorsal midline, triangular in lateral view (Fig. 47), antecosta with a pronounced processus placed into 8th segment (Fig. 24). Sternite IX subtriangular in ventral view. Ectoproct ovoid with 12-20 trichobotria. Catoprocessus long with a very acute and sclerotized apex, bent downward and inward. Gonarcus with rounded lateral plates. Entoprocessus strong (Fig. 49) and caudally bilobed (Fig. 51). Arcessus with two pieces at both sides of the midline (Fig. 51), each one with two branches, a ventral one that is subcylindrical, narrow and sinuous (Figs. 49,51) and a dorsal one that it is subconical and its apex opposite to the parameres. Parameres wide (Fig. 52), fused anteriorly (Fig. 53) and with two sclerotized conical teeth. Hypandrium triangular with sinuous margins (Fig. 54).

Female: Tergites VIII and IX dorsally divided into two pieces on its dorsal midline. Ectoproct subtriangular (Fig. 45) with 14-19

trichobotria. Lateral gonapophyses small. No subgenital plate. Spermatheca as usual.

It should be noted that the type series is comprised of three syntypes. BANKS (1920) original description refers to N. 10854 as an attempt to designate a holotype, but this reference and the type label is common to the three specimens and the capture data are mixed in the original description so it is not possible to differentiate any one



M. igorotus Banks, 1920, ♂ specimen from Popular Rep. China.

Figg. 46-54 - 46. Wings (pointed limits missing parts); 47. Apex of abdomen, lateral view. 48. Silhouette of IX sternite, ventral view; 49. Gonarcus - Arcesus, lateral view; 50. Same, ventro caudal view; 51. Same, caudal view; 52. Parameres, lateral view; 53. Same, dorsal view; 54. Hypandrium, ventral view. Scale in mm.

specimen as a holotype. To normalize this situation I designate the specimen collected in Los Baños as the lectotype and the other two specimens as paralectotypes.

Finally, it should be noted that MONSERRAT (1990a) in his revision of the *Micromus* species described by L. Navás, cites two paralectotypes (1 male and 1 female) of *M. alternans* Navás, 1922 that could not be assigned to *M. timidus* Hagen, 1853 with which Navas' species was synonymized, after designating a lectotype. With an improved knowledge of the morphology and genitalia of *M. igorotus*, the female paralectotype mentioned above should be considered as belonging to this species.

Material examined: Los Baños w.d. 1 ♀ P.I. Baker *Micromus igorotus* Bks. TYPE 10854 (MCZ), 1 ♀ P.I. Baker (MCZ). Baguio, Benguet w.d. 1 ♀ P.I. Baker *Micromus igorotus* Bks. TYPE 10854 (MCZ). Luzon, Mt. Makiling w.d. 1 ♀ P.I. Baker *Micromus igorotus* Bks. TYPE 10854 (MCZ). REPUBLIC OF CHINA: Foochow 1936-1937 1 ♂ M.S. Yang Pres by Com. Inst. Ent. BM 1950-96 (BM). Tonkin, Cho Gahn w.d. 1 ♀ *Micromus benardi* Navás S.J. det. (MZB).

***Micromus lanosus* (Zélény, 1962)**

Known from Europe.

Material examined: SPAIN: Huesca, Plan 4.VIII.1989 5 ♂♂ on *Corilus avellana*, A. Baz (V.M.).

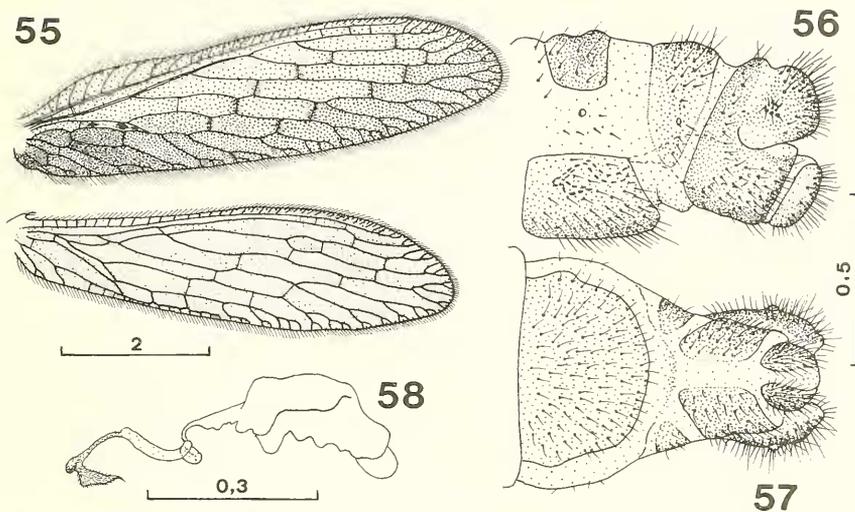
***Micromus linearis* (Hagen, 1858).**

Species described and only recorded from Sri Lanka.

Its type series species is comprised of four syntypes with identical data on their capture and typification. I designate and label one as lectotype and the others as paralectotypes.

The specimens of this series are identical to those known as *Micromus multipunctatus* Matsumura, 1907, a species that is well documented with respect to its external morphology and male genitalia and widely distributed from Sri Lanka to Japan.

Its venation characters (Fig. 55), such as the fusion of CUA-MP in both wings and the lengthening of the CUP on the marginal region of the hind wing that isolates a series of small cells, like those found in *M. tasmaniae*, *M. oblongus* or *M. parallelus*, make this species unmistakable.



M. linearis (Hagen, 1858).

Figg. 55-58 - 55. Wings; 56. Apex of abdomen ♀, lateral view. 57. Same, ventral view; 58. Spermatheca, lateral view. (55: paralectotype, 56-58: lectotype). Scale in mm.

The new synonymy is proposed as follows:

Micromus linearis (Hagen, 1858)

= *Micromus multipunctatus* Matsumura, 1907: 171 **n. syn.**

On the basis of the material studied I describe the female genitalia which were hitherto unknown.

Female: First tergites very small, rectangular and with antecosta well marked. Sternite VII semicircular (Fig. 57). Tergite VIII dorsally subdivided in two parts as IX tergite, its ventral portion has straight margins (Figs. 56,57). Ectoproct small, subtriangular. Cercal callus with 8-9 trichobotria (one specimen has 11). Lateral gonapophyses very small (Fig. 56). Without subgenital plate. Spermatheca as Fig. 58.

Material examined: CHINA Foochow VI.1935 1♂ M.S. Yang (BM). Guangxi Bama I.1988 1♂, 2♀♀ S.W. Fowler (BM). Kwangsi, Liuchow 22.XII.1981 1♂, 1♀ Peng Liu (MZH). San nen kal, Yunnan Fou w.d. 1♂ (MZH). FORMOSA: Arisan 6.VI.1931 1♀ L. Gressitt (MCZ). India: Agra 11.VIII.1979 1♂, 1♀ V.J. Monserrat (VM). Darjeeling 7000 ft, 12.III.1934 2♂♂ R.W. Hingston (BM). Khasis w.d. 2♂, 1♀ McLachlan (BM). Masuri, Lang 7000 ft, w.d. 1♀ MacLachlan (BM). India M.P., Chindwara 5.XII.1969 1♀ col.? (BM). Sikkim, Gangtok 11.II.1952 2♂♂ T. Clay (BM). Srinagar 7.VIII.1979 2♂♂ V.J. Monserrat (VM). INDONESIA: Java Nongkodjar

I.1911 1♀ E. Jacobson (ML). JAPAN: Idzu VI.1910 1♂ S. Akiyama (BM). Karuizawa 3.VI.1952 1♂ Savolainen (MZH), 2.VII.1952 1♂ Savolainen . (MZH). MALAYSIA: Sabah, Mt. Kinaloalu 7500 ft, 11-VIII-1982 2♂♂, 3♀♀ Teleman (BM). NEPAL: Kathmandu 20.V-23.VI.1983 1♂ A. Brendell (BM). PHILIPPINES: Luzon, Acupan, Benguet 3.VIII. 1♂ C.S. Banks (MCZ). Banguio, Benguet w.d. 1♀ Baker (MCZ). Hightsplace III.1917 2♀♀ col.? (MCZ). Mindanao, Dapitan w.d. 1♂ Baker (MCZ). SRI LANKA: Ceylon w.d. 1♀ Hagen TYPE 10445 (MCZ), Ceylon w.d. 1♀ Nietner, Hagen TYPE 10445 . (MCZ), Ceylon w.d. 1♀ Hagen TYPE 10445 . (MCZ). Gabiuy bai Negombo w.d. 1♀ Hagen, TYPE 10445 *M. linearis* Hagen (MCZ). Some on trees.

Micromus longispinosus (Perkins, 1899).

Known from Hawaii.

Material examined: HAWAII: KAU, 4000 ft, VIII.1895 1♂ Perkins *Nesomicromus longispinosus* TYPE (BM). Puna District, Kahuku Ranch, Punaluu Kaha-wai 9.VII.1973 1♂ K. & E. Sattler (BM), Volcano 3800 ft, 28.IV.1973 1♂ K. & E. Sattler (BM), 3.V.1973 1♀ K. & E. Sattler (BM), 30.V.1973 1♂ K. & E. Sattler (BM). Haw. Pat. Park VIII.1952 right wings, ♀ ? D.E. Hardy (BM).

Micromus minimus (Perkins, 1899) nec Yang, 1988.

Known from Hawaii.

I have studied several specimens of this species labelled as type, one in the British Museum and two in the Museum of Comparative Zoology. In the original description Perkins, 1899 does not designate any holotype and I propose designating the syntype in the BM collections as lectotype.

Material examined: HAWAII: KAU, 4000 ft, VIII.1895 1♀ Perkins *Nesomicromus minimus* TYPE (BM), VIII.1895 1♂ R.C. Perkins 99.382 *Nesomicromus minimus* Perk. COTYPE, TYPE 9012 (MCZ), VIII.1895 1 specimens without hind wings nor abdomen *Nesomicromus minimus* Perk. TYPE 9012 (MCZ), VIII.1896 1♀ Perkins (BM). Kona 4000 ft, VIII.1892 1♂ Perkins (BM). LANAI: Puna District, Vulcano 3800 ft, 6.VI.1973 1♀ K. & E. Sattler (BM). MOLOKAI, Molokai Mts., 3000 ft, VI.1896 1♂, 3♀♀ Perkins (BM). Volcanoes N.P., Napau Crater Area 2750 ft, 9.V.1976 1♂ K. & E. Sattler (BM).

Micromus minimus Yang, 1988 nec Perkins, 1899.

Described from China and seems near or probably the same as *M. perelegans* Tjeder, 1937. The homonymy must be resolved and I propose this new name:

Micromus minusculus n. n. for *Micromus minimus* Yang, 1988: 199 nec Perkins, 1899.

***Micromus montanus* Hagen, 1886.**

A Nearctic species.

Material examined: CANADA: S E Labrador, Forteau N O, 290, 15.VII.1951 1 ♂ Lindroth (MZH). UNITED STATES: Arizona w.d. 1 ♂, 2 ♀♀ McLachlan (BM). California, S^a Nevada w.d. 1 ♂ McLachlan (BM). Colorado w.d. 4 ♂♂, 1 ♀ McLachlan (BM). Mt. Hood w.d. 1 ♂, 2 ♀♀ McLachlan (BM). Mt. Washington w.d. 2 ♂♂, 3 ♀♀ (BM). Vineyard, Spalding 8.VIII 1 ♀ N. Banks (BM).

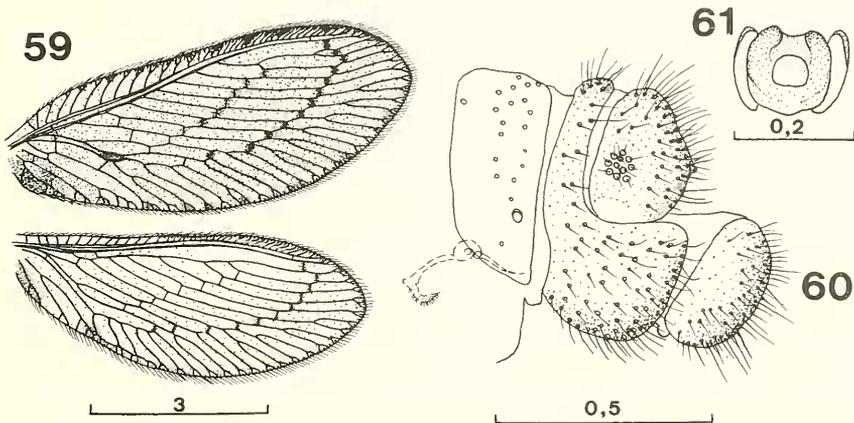
***Micromus nigrifrons* Banks, 1937.**

A Philippine species only known by its original description.

On the basis of the type specimen, I give new data on its morphology, wings and genitalia.

REDESCRIPTION – General colour dark brown with blonde setae. Head with clypeus and lower half of front dark brown, upper half yellow. Vertex dark brown with a straight yellow midline near posterior margin. Scape and pedicel darker than flagellum.

Thorax dark brown. Legs brown, femur darker dorsally and with three dark spots on distal half of tibia. Wings as in Fig. 59, forewings brown with irregular darker stripes on C, SC and R. Gradates dark,



M. nigrifrons Banks, 1937, Holotype ♀.

Fig. 59-61 – 59. Wings; 60. Apex of abdomen, lateral view. 61. Subgenital plate, ventral view. Scale in mm.

especially the external. In these places the membrane is darker, also in MP-CuA and anal field. Pterostigma indistinct. Hindwings with venation and membrane pale brown, but external gradates, cubital-anal margin and anal field are darker.

Tergite VIII broad, IX tergite not dorsally fused. Ectoproct ovoid with a knob on the caudal margin (Fig. 60), cercal callus with 10-12 trichobotria. Lateral gonapophyses semispherical (Fig. 60). Subgenital plate as Fig. 61. Spermatheca usual.

The colour and general appearance of this species is very similar to *M. gratus* Banks, 1937. The wings of the types of both species present some differences regarding width, apical acuteness, the number of radial sectors and the positioning of the gradates. With respect to the female genitalia, there are some differences in the ectoproct, the size of the lateral gonapophyses and the subgenital plate but the margin of variability is unknown and they are probably the same species. Until male specimens can be found I maintain its possible validity.

Material examined: PHILIPPINES: Mindanao, Mt. Apo, Galog Riv, 6000 ft, XI 1 ♀ C.F. Clagg *Micromus* (*Archaemicromus*) *nigrifrons* Bks, TYPE 20206 (MCZ).

Micromus numerosus Navás, 1910.

This species has been recorded from Japan, Ryukyu and China.

It is very close to *M. timidus* Hagen, 1853, although its wings are usually larger, and less pigmented. The genitalia, whether male or female, are the only certain distinguishing characters. In male of *M. numerosus* the ectoproct is much longer, the aecessus is conical and thick, and the entoprocessus are blunt. The VIII tergite in the females is very wide, the IX tergite has a very pointed and acute ventral margin and the lateral processus are very short, the subgenital plate is heart-shaped, almost square, and not spatulated.

Despite the margin of variability that exists in *M. timidus*, the species we examined seems to be sufficiently separate from it. *M. numerosus* is limited at first to the region between Formosa and Japan, and it is probable that some of the records of *M. timidus* for this region actually correspond with *M. numerosus*.

On the contrary this species is identical to *M. confusus* (Nakahara, 1964) and the arguments differentiating the two are not sufficiently valid. The new synonym is proposed in these terms:

Micromus numerosus Navás, 1910

= *Eumicromus confusus* Nakahara, 1964: 246 **n. syn.**

Material examined: CHINA: Gang Ksu, Fukien, S. China 25.VII.1936 1♀ L. Gressitt (MCZ). Tai Yong, Kwantung 5.VIII.1936 1♀ L. Gressitt (MCZ). Kwangxi, Bame 1.1988 1♀ S.V. Fowler (BM). Yim Na, Kwantung 15.VI.1936 1♀ (MCZ). FORMOSA: Kuraru 5.V.1934 1♀ L. Gressitt (MCZ). Taihoku 27.III.1932 1♀ L. Gressitt (MCZ). JAPAN: Kiushiu w.d. 1♀ col.? (MCZ). RYUKYU: IRIOMOTE 20.VIII.1934 1♂ L. Gressitt (MCZ). LOOCHOO, Amami Oshima 9.VII.1931 1♂ L. Gressitt (MCZ), Okinawa 31.VIII.1934 1♂, 1♀ L. Gressitt (MCZ).

Micromus ombrias (Perkins, 1899)

Known from Hawaii.

Material examined: HAWAII: Oahu, Koolau Range, Paalaa Uka, Poamoho Trail, 2400 ft, 29.IX.1976 1♂ K. & E. Sattler (BM).

Micromus paganus (Linnaeus, 1767)

A Palaearctic species.

Material examined: FINLAND: Abak Sav., w.d. 1♀ Hammarstr. (MZH). Amur Fl., 4.IX.1917 1♀ Y. Wuorentaus (MZH). Irkutsk w.d. 1♀ Ahnger (MZH). Krasnojarsk w.d. 1♀ Y. Wuorentaus (MZH). Ussuri, Spasskaja 25.IX.1917 1♂ Y. Wuorentaus (MZH). FRANCE: Auvergne 1899 1♀ McLachlan (BM). Haute Garonne, St. Béat 14.VII-18.VIII.1933 2♀♀ B. Verdcourt (BM), Luchon 26.VI-13.VII.1933 1♂ B. Verdcourt (BM). Haute Savoie, Le Buet 21.VII.1925 1♂, 1♀ M.E. Mosely (BM). Puy de Dôme, Le Mont Dore 24.VI-6.VIII.1934 3♂♂, 1♀ M.E. Mosely (BM). Vosges, Gérardner 27.VI-7.VII.1930 1♂, 2♀♀ M.E. Mosely (BM). Retournermer 7-31.VII.1930 1♂, 1♀ M.E. Mosely (BM). Pyr., Ariège, Hospitalet 1420-1500 m, 7-25.VI.1950 1♂ col.? (BM). Thues les Bains 28.VI.1900 1♀ Wlsm. (BM), 9.VII.1900 1♂ Wlsm. (BM). GERMANY: Heiligenblut, Kärnten 1955 1♂, 1♀ G.de Lattin (MH). Nieder Saksen, Niemental 17.VI.1962 1♀ J.C. Deeming (BM). Schau Sig. Alt Mus 7.III 2♀♀ W. Wüstnei (MH). ITALY: Alpe le Piane, Biella, Val Chiobbia 1300 m, 5.VIII.1931 1♀ F. Capra (MG), Val Chiobbia 26.IX.1947 1♀ F. Capra (MG). Foresta Campigna, App. Tosco Romagnolo 6-9.VIII.1937 1♀ A. Andreini (MG). M. di Campiglio, Trentino 1522 m, 27.VII.1933 1♂ Hartig (MG), 5.VIII.1933 1♀ Hartig (MG). Piedicavallo, Val Cervo 8.IX.1954 1♀ F. Capra (MG), 5.IX.1955 1♀ F. Capra (MG), 10.IX.1955 1♀ F. Capra (MG), VIII.1956 1♂, 1♀ F. Capra (MG). Piemonte, Val d'Aosta, S. Giacomo d'Ayaz VIII.1912 1♀ Solari (MG). Verrana 8.VII.1936 1♂ G.C. Doria (MG). Sila, Calabria, Camigliatello, 1.VII.1933 1♂ A. Dodero (MG). NORWAY: Sti, Oppdal, Kangavoll 28.VI.1985 1♂ K.R. Tuck (BM). SWEDEN: Dle, Falun 4.VII.1927 1♂ B. Tjeder (BM). UNITED KINGDOM: Barkway, Herts 22.V.1947 1♂ H.L. Stroyan (BM). Berks, Naidenhead, Kimbers 7.VI.1982 3♀♀ B. Verdcourt (BM), VI.1978 1♂ B. Verdcourt (BM). Huntingdon, Wood Walton Fen., 25.V.1972 1♂ V.F. Eastop ex. *Dactylis glomerata* (BM). Wales, Anglesey Lligway Bay 19.V.1982 1♂ P.E. Whalley (BM).

Micromus paradoxus (Perkins, 1899)

Known from Hawaii.

Material examined: HAWAII: KAU 4000 ft, VII.1895 1♀ Perkins *Nesomicromus paradoxus* TYPE (BM). MOLOKAI, Puukolekole, T.H. VII.1952 1♂ D.E. Hardy (BM). Upper Hamakua, Kohala Mt. 3.IX.1919 1♂ O.H. Swezey (BM). Waikalu Valley, Molokai 1.V.1955 1♂ J.L. Gressitt (BM).

Micromus perelegans Tjeder, 1937

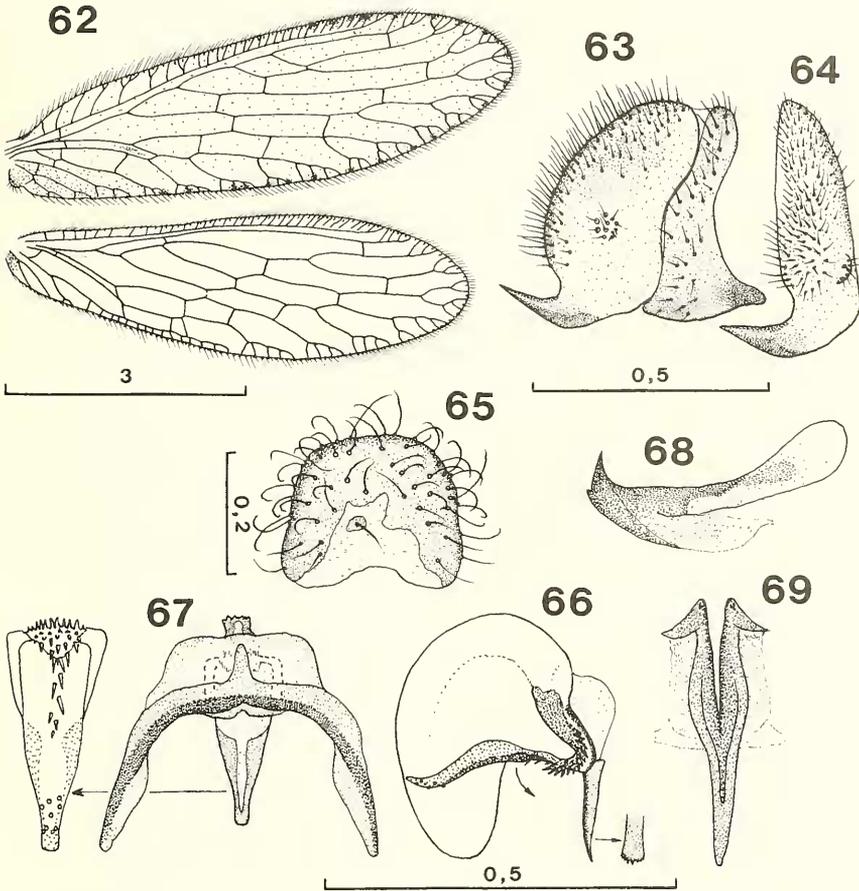
TJEDER, 1937 described this species from China on the basis of a single specimen that was poorly preserved and apparently teneral, and there has been no other reference to this species beyond TJEDER, 1970 who briefly comments on its male genitalia.

A male specimen collected in Nepal can be assigned to this species on the basis of its general external morphological characters and, in particular, on those of its genitalia. The purpose of the description of this specimen is to widen the morphological data on the species and its possible margin of variability.

The external morphology of the new specimen coincides exactly with that mentioned by Tjeder, 1937, except for the new data noted here that were either omitted or could not be appreciated given the immaturity of the type.

Head with upper margin of toruli also brown and with two short brown stripes between them on both sides of midline. Scape and pedicel brown on anterior surface but yellow posteriorly. Thorax dark brown with a wide yellow mid stripe that continuous onto abdomen. Tibiae with two preapical dark shadows, darker in L1 and L2. Setae of legs and thorax blonde. Wings as Fig. 62. With variable number of transverse veins in the same specimen. Forewings with pale venation, but costal is darker striped (especially in pterostigma), also beginning of Rs, gradates and MP fork are darker. Membrane hyaline, only a dark shadow on MP-CuA and on the anal field are present. Pterostigma indistinct. Hindwings with hyaline venation from the basis to the inner gradates and dark from those to the margin. Membrane hyaline, a little darker on the anal region.

Basically, the genitalia of the new specimen coincide with what was noted by TJEDER (1937). However, in the new specimen (Figs. 63-69), the ectoproct is less ovoid, the number of trichobotria is greater (9-11) and the catoprocessus is shorter and more robust. Among other



M. perelegans Tjeder, 1937 ♂ from Nepal.

Figg. 62-69 - 62. Wings; 63. IX tergite and ectoproct, lateral view; 64. Ectoproct, caudal view; 65. IX Sternite, ventral view; 66. Gonarcus - Mediuncus, lateral view. Associated apex of mediuncus in caudal view; 67. Same, dorsal view. Associated arcessus in ventral view (slightly magnified); 68. Parameres, lateral view; 69. Same, dorsal view. Scale in mm.

previously unknown genital data are the presence of a square IX tergite (Fig. 65), that is irregular and incompletely sclerotized and carries curved setae as well as a preapical denticule (Fig. 68) on one of the parameres (lacking on the other paramere).

These differences are insufficient to support the existence of two different species and a certain degree of variability in the external

morphology and genitalia can be supposed. This converts to *M. myriostictus* Yang, 1988 and *M. minimus* Yang, 1988 (here renamed *M. minusculus*) as presumable synonyms of *M. perelegans* and leaves the characteristic of a preapical tooth on the parameres, used by TJEDER (1937) to distinguish this species from *M. variegatus* (Fabricius, 1793), without validity, bringing them even closer.

Material examined: NEPAL: Taplejung Distr., Above Sangu, on old stone wall, 7000 ft, 7.I.1962 1 ♂ Brit. Mus. East Nepal Exp. 1961-1962 R.L. Coe Coll. B.M. 1962 - 177 (BM).

Micromus perezaballosi n. sp.

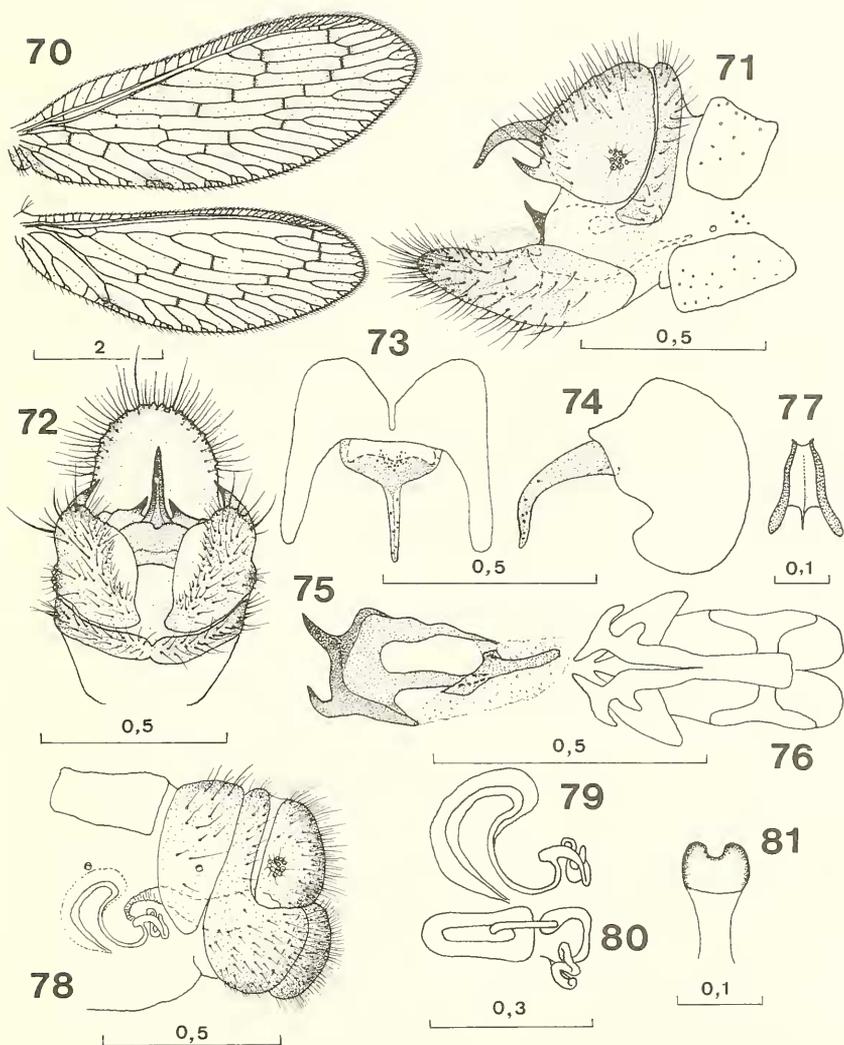
Material examined: INDONESIA: Sulawesi Utara, Dumoga Bone N.P. 5.II.1985 1 ♂ in alcohol. Project Wallace B.M. 1985-10 R. Ent. Soc. London Fog. 1230 m Plot A. HOLOTYPE (BM). With the same data 2 ♀♀ PARATYPES (BM).

DESCRIPTION – Head yellowish, vertex darker. Antennae yellowish, scape conical in dorsal view, its external margin is straight and the inner very convex. Pedicel fusiform. Flagellum with pale setae. Palps yellowish.

Thorax with pronotum pale brown with two posterior brown spots. Its anterior margin rounded, the posterior geniculate. Mesonotum brown, metanotum darker, probably living specimens have a medial dorsal pale stripe. Legs yellowish, without dark spots, CX2 and CX3 darker. Wings as in Fig. 70. Forewings brown very pale, darker at beginning of Rs, trasverse veinlets and gradates. Membrane darker there and in CU-A margin. Hindwings lighter, veins and membrane darker in gradates and CU-A margin.

Abdomen yellowish.

Male tergites proportionally small and rounded. VII and VIII tergites rectangular as in sternites. Sternite VIII trapezoidal with straight anterior margin. Tergite IX narrow and not fused with ectoproct (Fig. 71) which is subtriangular. Cercal callus with 10-13 trichobotria. Catoprocessus bent inward and upward (Figs. 71,72). Sternite IX ovoid in ventral view (Fig. 72), with membranes on its dorsal face that associate with parameres (Fig. 71). Gonarcus wide with a decolletage deep on midline (Fig. 73). Arcessus broad in the basis and conical and curved towards the apex which has sensorial points (Figs. 73,74). Parameres very complex and peculiar in this genus, caudal portion with two pairs of teeth very sclerotized and strong, each pair is elongated into an anterior medial plate (Fig. 76) associated with two



M. perezaballoi n. sp.

Figg. 70-81 - 70. Wings; 71. Apex of abdomen ♂, lateral view; 72. Same, dorsal view; 73. Gonarcus - Arcessus, dorso caudal view; 74. Same, lateral view; 75. Parameres, lateral view; 76. Same, dorsal view; 77. Hypandrium, ventral view; 78. Apex of abdomen ♀, lateral view; 79. Spermatheca, lateral view; 80. Same, ventral view; 81. Subgenital plate, ventral view. Scale in mm.

lateral plates by a membrane (Figs. 75,76). Hypandrium subtriangular and narrow (Fig. 77).

F e m a l e tergite VIII large and subtriangular. Tergite IX broad. Ectoproct ovoid (Fig. 78) with 17-18 trichobotria. Lateral gonapophyses narrow. Subgenital plate very small, with a decolletage in U (Fig. 81). Spermatheca complex and sinuous (Figs. 79,80), associated with a membranous distal duct (Fig. 78).

DISCUSSION – Seven species have been described or recorded from the Australian Region. Eight other species from the Pacific and Oriental transition regions or adjacent areas could also be associated with the first seven. The morphology and genitalia of many are well known while, on the contrary, we only have a few data as to the wing and external morphology of other species.

Characteristics of external morphology and wing venation, particularly wing vein density, and the basal fusion between MP and CuA in the forewings clearly differentiates *M. perezaballoi* n. sp. from *M. morosus* Gerstaecker, 1893 from Java, *M. jacobsoni* Esben-Petersen, 1926 from Sumatra, *M. igorotus* Banks, 1920, *M. nigrifrons*, *M. placidus* and *M. gratus* Banks, 1937 from the Philippines, *M. neocaledonicus* (Nakahara, 1960) from New Caledonia and *Micromus* sp. New, 1988 from Papua New Guinea.

The above mentioned characters together with the known data on the genitalia, whether male or female, also allow it to be clearly distinguished from *M. timidus* Hagen, 1853 a paleotropical species, *M. tasmaniae* (Walker, 1858) from the Australian Region, *M. calidus* Hagen, 1859 from the Oriental Region, *M. bifasciatus* Tillyard, 1923 from New Zealand and *M. marquesanus* (Kimmins, 1932) from Marquesas.

Among the species where MP and CuA are partially fused, this new species differs from *M. linearis* (Hagen, 1858) of the Oriental Region and *M. brandti* New, 1988 from Papua New Guinea, with respect to the male and female genitalia. Finally, with regard to *M. loriamus* (Navás, 1929) from New Guinea, the differences in tegumentary colour, pigmentation and wing venation as well as genitalia are marked (NEW, 1988b).

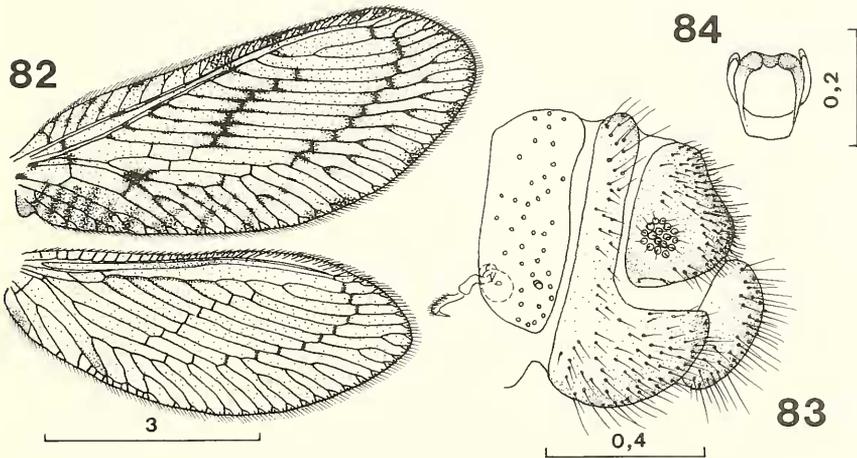
I dedicate this new species to my friend Dr. Juan Perez Zaballos in recognition of his work on Carabidae.

***Micromus placidus* Banks, 1937**

This species is only known from its original description based on a female collected in the Philippines. So as to provide new data, based on the same specimen, I hereby redescribe it:

REDESCRIPTION – Head yellowish brown, very bright with blond setae. Antennae brown, darker the inner face of scape. Palps brown.

Thorax yellowish brown with shining setae. Pronotum with two triangular brown dark spots on both sides of midline, laterally also dark brown. Meso and metanotum dark brown with a wide yellowish brown medial stripe. Legs brown with hyaline setae and with dark brown spots as follows: in L1 on the 2nd and 4th fifth of tibia, L2 on distal end of femur and with tibia as L1, L3 with femur as L2. Wings as Fig. 82. Forewings with brown venation, darker in irregular stripes on C, Sc and R. Gradates dark brown, darker the inner. Rs irregularly striped up to inner gradates. Cu and A also striped with shadows on membrane. A dark spot is present on the base of AA. Membrane darker around those darker veins. Pterostigma indistinct. Hindwings with venation and membrane paler, only basal part of Rs, prepterostigmatic C, Sc and R, cubital and anal region, external gradates and longitudinal veins from these to the margin are darker. Pterostigma indistinct.



M. placidus Banks, 1937. Holotype ♀.

Figg. 82-84 - 82. Wings; 83. Apex of abdomen, lateral view. 84. Subgenital plate, ventral view. Scale in mm.

Female: Tergite VIII wide and strong (Fig. 83). Tergite IX dorsally separated in midline. Ectoproct subtriangular, cercal callus with 16-17 trichobotria. Lateral gonapophyses proportionally small. Subgenital plate as Fig. 84. Spermatheca as usual.

This species possesses characters that are intermediate between *M. gratus* Banks, 1937 and *M. nigrifrons* Banks, 1937 (also from the Philippines) and some particular characters in relation to its venation and wing pigmentation. The taxonomic importance of the latter characters is particularly scarce in many species in this genus (TJEDER, 1961, MONSERRAT, 1990a). Only the study of new material that can give data on *M. placidus* male genitalia will clear up the validity of these species.

Material examined: PHILIPPINES: Island Samar w.d. 1 ♀ Baker. *Micromus* (*Archaeomicromus*) *placidus* Bks. TYPE 20205 (MCZ).

Micromus posticus (Walker, 1853)

A nearctic species.

Material examined: UNITED STATES: Many specimens without any other data, from Texas, Belfrage, Dohan Mass., Missouri. N.Y. Angus West Farms, North Carolina, Georgia w.d. 1 ♂ McLachlan, TYPE and 1 ♀ PARATYPE McLachlan, from McLachlan col. (BM). Aiken Co, Savannah R. Plant 13.VI.1977 1 ♀ H. Prichard (CAS), 8.VII.1977 1 ♀ H. Prichard (CAS), 16-17.VII.1980 2 ♂♂ R. Kelley & E. McEvan (CAS), Runs Cr., 29.VII.1984 1 ♂ J. Morse (CAS). Anderson Co. Sc. Simpson Exp. Sta. 31.V.1977 1 ♂ G.T. Lee (CAS), 17.VII.1978 10 ♂♂, 8 ♀♀ G.T. Lee (CAS). Fla., Highlands Co. H'lands Hammock St. Park 28.XII.1965 1 ♀ R.G. Beard (BM). Pickens Co, Sc. Isaqueena Forest 2.VIII.1984 1 ♀ at light K. Hoffman (CAS). Winter Park, Fla 26.III 1 ♀ E.M. Davis (BM)

Micromus rubrinervis (Perkins, 1899)

Hawaiian species, probably the same as *M. minimus* Perk.

Material examined: HAWAII: Devonshire E, R.C.L. w.d. 1 ♂ Perkins (BM). Hilanea 9.V.1912 1 ♀ D.T. Fullaway (BM), 13.V.1912 1 ♂ D.T. Fullaway (BM). Kau 16.I.1917 1 ♂ W.M. Giffard (BM). Puna District, Volcano 3800 ft, many specimens collected in V-VI.1973 K. & E. Sattler (BM). S. Hilo District, Hilo Forest Reserve 30.V.1973 1 ♀ K. & E. Sattler (BM). Volcanoes N.P., Napau Crater Area 9.V.1976 1 ♂ K. & E. Sattler (BM) Thurston Lava Tube 24.V.1973 1 ♂ K. & E. Sattler (BM), 30.V.1973 1 ♂ K. & E. Sattler (BM).

Micromus subanticus (Walker, 1853)

Widely known from the Nearctic and recorded in the Caribbean from the Dominican Republic and Cuba (ALAYO, 1968, MACLEOD & STANGE, 1981).

The type series of *Micromus haitiensis* Smith, 1931 belongs to this species. A new synonymy is proposed:

Micromus subanticus (Walker, 1853)

= *Micromus haitiensis* Smith, 1931: 800 **n. syn.**

As a consequence the genus *Menutus* described by Navás, 1932 for this species and which is based on irrelevant characters becomes one of the synonyms of *Micromus*. The new synonymy is proposed in these terms:

Micromus Rambur, 1842

= *Menutus* Navás, 1932: 35 **n. syn.**

Material examined: HAITI: Buchanan, P.R. 25.VI.1943 1♀ L.T. (MCZ). L. Tortuguero, P.R. 15.VIII.1944 1♀ A. Guerney (MCZ). Port au Prince 9.I.1929 1♀ A. Audant *Micromus haitiensis* R.C.S. PARATYPE, TYPE 16545 (MCZ), Port au Prince, Lights Petionville 17.II.1930 1♀ H.L. Dozier *Micromus haitiensis* R.C.S. HOLTYPE, TYPE 16545 (MCZ). UNITED STATES: Florida, E. Doubleday, St. John's Bluff 16.II.1839 1♂ col.? *subanticus* TYPE (BM). Fisheating Cr., Palmdale 7-10.V.1964 2♂♂, 2♀♀ R.W. Hodges (MZH). North Carolina w.d. 1♀ McLachlan (BM). Ohio, Wayne Co, Wooster 26.VIII.1983 1♀ K. Hoffman (CAS). S.C., Aiken Co, Savannah Runs Cr. 18.V.1977 1♀ H. Prichard (CAS), 28.V.1984 1♂, 1♀ J. Morse (CAS). Anderson Co, Simpson Stat. 6.V.1974 1♀ R. Peigler (CAS). Bowman 26.III.1978 1♀ C. Staudenmir (CAS). Oconee Co., 15.X.1978 1♂ M. Lanning (CAS), S. Cove 5.V.1976 1♀ H.L. Dozier (CAS). Pickens Co., Isaqueena Forest 2.VIII.1984 2♀♀ K.H. Hoffman (CAS). Pickens Co., Clemson, many specimens collected by different persons in V-X (CAS). Texas, Belfrage 19.II. 1♂ McLachlan (BM), 8.V 1♀ McLachlan (BM), 22.V 1♀ McLachlan (BM). Dallas w.d. 1♂ McLachlan (BM), 5.V 1♂ McLachlan (BM), 6.V 2♂♂ McLachlan (BM). George Town 15.IV.1937 1♂ L.J. Mine (BM). Virginia, Shenandoah Valley nr. Luray 4.VI.1975 1♀ B.J. Harrington & P.S. Broofield (BM). Mostly at light.

***Micromus subochraceus* (Perkins, 1899)**

Known from Hawaii.

Material examined: HAWAII: KAU, Kau 4000 ft, VIII.1896 3♂♂ Perkins (BM). Kona w.d. 1♀ H.T. Osborn (BM), 2000 ft, IX.1892 2♀♀ Perkins (BM), X.1892 1♀ Perkins (BM). MOLOKAI, Molokai Mts., 2000 ft, VI.1896 1♂ Perkins *Nesomicromus subochraceus* Perk. TYPE (BM). OAHU, Kalihi 17.V.1914 1♂ O.H. Swezey (BM). S. Kona 16.VIII.1914 1♀ O.H. Swezey (BM).

***Micromus tasmaniae* (Walker, 1858)**

A very variable species known from New Zealand, Tasmania, Australia and the New Hebrides, more distributed in the Pacific after the study of the present material.

Material examined: AUSTRALIA: NEW SOUTH WALES, Black Heath 6.XI.1884 1♀ McLachlan (BM), 4.XII.1884 1♂ McLachlan (BM). Cabramatta, many specimens collected during X-III M.I. Nikitin (BM). Cooma 14.X.1918 1♀ col.? (BM).

Hawarra w.d. 1♀ H. Petersen (MCZ). Merrylands 25.XI.1964 15♂♂, 11♀♀ M.I. Nikitin (BM). Mt. Kosciusko 10.IX.1931 1♂, 2♀♀ Australia Harvard Exp. (MCZ). Mt. Wilson, Blue Mts. 24.I.1932 1♀ Australia Harvard Exp. (MCZ), 28.I.1932 1♀ Australia Harvard Exp. (MCZ). Nat. Park 6.XI.1915 1♀ R.J. Tillyard (BM), 1932 1♀ H. Petersen (MCZ). Sydney 26.VIII.1884 2♂♂ McLachlan (BM), VII.1953 1♂, 1♀ J.D. Bradley (BM), II.1954 1♂ J.D. Bradley (BM). QUEENSLAND: Brisbane 25.XII.1915 1♀ col. ? (BM). Crows Nest 24.XI.1926 1♀ Fletcher (BM). Tambourine Mts 2-9.IV.1935 1♀ R.E. Turner (BM), 1-9.V.1935 1♀ R.E. Turner (BM), 11-17.V.1935 1♂ R.E. Turner (BM), 18-25.V.1935 2♂♂ R.E. Turner (BM). WESTERN AUSTRALIA, Dongarra 4-10.X.1935 5♀♀ R.E. Turner (BM). Perth 10.IX.1931 1♂, 2♀♀ Australia Harvard Exp. (MCZ). Rottneest Is. X.1931 1♂ Australia Harvard Exp. (MCZ). Yanchep, 32 mls N of Perth 24.XI-2.XII.1935 1♂, 1♀ R.E. Turner (BM), 20-31.XII.1935 1♂, 3♀♀ R.E. Turner (BM). NEW CALEDONIA: Pucbo Coast 1500 ft. X.1949 1♀ L.E. Cheesman (BM). NEW HEBRIDES: Aneltyum, Red Crest 1200 ft, 3 m N.E. Anelgauhat VI.1955 2♀♀ L.E. Cheesman (BM). Tanna X.1930 1♀ L.E. Cheesman (BM). NEW ZEALAND: Gisborne 7.X.1916 1♂ G. Lyell (BM), 19.XI.1926 1♀ G. Lyell (BM), Gollans Valley 30.I.1923 1♀ G.V. Hudson (BM), XII.1932 2♀♀ G.V. Hudson (BM). Governors Bay 2.XII.1921 1♀ E.S. Gourlay (BM). Karori IV.1912 1♂ G.V. Hudson (BM), 18.X.1934 1♀ G.V. Hudson (BM). Mount Cook Nat. Park, Governor's Bush 29.I.1972 1♀ W.J. Knight & P.S. Broomfield (BM), 12.II.1972 1♀ W.J. Knight & P.S. Broomfield (BM), Mount Sebastopol 7.II.1972 1♂, 1♀ W.J. Knight & P.S. Broomfield (BM). Napier 24.XI.1987 1♂, 1♀ A. López (VM). New Brighton, Dyer's Road 11.XI.1922 1♂ J.W. Campbell (BM). Ngatarawa Hastings 25.XI.1975 2♂♂ K.G. Somerfield on *Medicago sativa* (BM). Ohakune 1922-1923 2♂♂, 7♀♀ T.R. Harris (BM), XI.1922 2♂♂, 2♀♀ T.R. Harris (BM). South Karori 5.X.1935 1♀ G.V. Hudson (BM). Tambourine Mts. 1-9.V.1935 1♂ R.E. Turner (BM). Tasman Valley, Ball Hut 4.II.1972 1♂, 2♀♀ W.J. Knight & P.S. Broomfield (BM), Bush Stream 5.II.1972 2♂♂, 4♀♀ W.J. Knight & P.S. Broomfield (BM), Glentanner Stn. 3.II.1972 1♀ W.J. Knight & P.S. Broomfield (BM), W Pukaki 2.II.1972 4♂♂, 4♀♀ W.J. Knight & P.S. Broomfield (BM). Titirangi III.1915 2 ej. A.E. Brookes (BM), 1919 1♂ A.E. Brookes (BM). Unwin Hut 30-31.I.1972 2♀♀ W.J. Knight & P.S. Broomfield (BM). Wainuiomata 27.II.1936 1♀ G.V. Hudson (BM). Wetington, Jutson w.d. 1♀ McLachlan (BM). Wiltons Bush 1894 1♀ G.V. Hudson (BM), 7.XII.1919 1♀ G.V. Hudson (BM), 9.II.1933 1♂ G.V. Hudson (BM). NORFOLK: Norfolk Isl. 29.VI.1939 2♂♂ I. McCormish (BM). Red Road 160 m, 2.XII.1975 3♀♀ F. Jowett (BM). TASMANIA: Tasmania W 68.3 1♀ Saunders TYPE *Hemerobius tasmaniae* W. (BM), 1♀ PARATYPE *Hemerobius tasmaniae* W. (BM). Some specimens on grass.

Micromus timidus Hagen, 1853

A very widely distributed species in the Afrotropical, Oriental, Australian and Pacific Regions. Many specimens have been examined from many localities, enlarging significantly their known distribution.

Material examined (only countries and islands are noted): AFROTROPICAL REGION: Equatorial Guinea (Annobon Is.), Ghana, Ivory Coast, Kenya, Mauritius Is., Mozambique, Nigeria, Principe Is., Reunion Is., Rodriguez Is., Seychelles (Mahe Is.), Sierra Leone, South Africa, Tanzania, Togo, Uganda. AUSTRALIAN REGION & PACIFIC: Australia (Queensland), Bismarck (New Britain Is., Bulolo), Fidji (Viti Levu Is.), Hawaii (Kauai Is., Maui Is., Molokai Is., Niihau Is., Oahu Is.), Indonesia (Celebes Is.), Marianas Is. (Guam Is.), New Caledonia, New Hebrides (Efate Is., Santo Is., Tanna Is., Aneityum Is.), Papua New Guinea, Salomon (Malaita Is.), Samoa (Pago Pago Is., Savaii Is., Tutuila Is., Upolu Is.), Tonga (Nuku'alofa). ORIENTAL REGION: China, Hong Kong, India, Indonesia (Sumatra Is.), Laos, Malaysia (Penang Is., Peninsular Malaysia), Nepal, Philippines (Leyte Is., Luzon Is., Mindanao Is.), Sry Lanka, Taiwan, Thailand, Vietnam.

Micromus vagus (Perkins, 1899)

An Hawaiian species very variable in size and colour intensity. In the original description Perkins, 1899 does not designate any type series and seven specimens labelled as type have been studied, one from the British Museum and six from the Museum of Comparative Zoology. The syntype in BM is designated as lectotype and the other syntypes of the MCZ are designated as paralectotypes.

Material examined: HAWAII: HAWAII: Hawaii Nat. Pk VIII.1952 1 ♀ H.A. Bess (BM). Humuula T.H. 7.VIII.1935 1 ♀ R.L. Ussinger (BM). Kilauea Crater VIII.1952 1 ♀ D.E. Hardy (BM). KAU: Kau VIII.1895 1 ♂ R. Perkins *Nesomicromus vagus* Perkins TYPE (BM), 4000 ft, VIII.1895 5 ♂♂, 6 ♀♀ R. Perkins (BM), VII.1896 1 ♂ R. Perkins (BM). KAUI: Alakai Swamp 3800 ft, VII.1952 K. & E. Sattler (BM), Kokee 6.VII.1937 2 ♂♂ E. Zimmerman (BM), 7.VII.1937 1 ♀ E. Zimmerman (BM), 14.VII.1937 1 ♂ E. Zimmerman (BM). Kokee State Pk., Awaawapuhi Valley 15.IX.1973 1 ♂, 1 ♀ K. & E. Sattler (BM), 23.IX.1973 1 ♂ K. & E. Sattler (BM), 17.VI.1982 1 ♂ K. & E. Sattler (BM). Halemanu 23.VIII.1973 1 ♀ K. & E. Sattler (BM), 3.X.1973 1 ♂ K. & E. Sattler (BM). Honopu Trail 22.VIII.1973 1 ♀ K. & E. Sattler (BM), 28.VIII.1973 1 ♂ K. & E. Sattler (BM), 4.VI.1982 1 ♂, 1 ♀ K. & E. Sattler (BM), Kahuamaa Flat 13.V.1982 1 ♂ K. & E. Sattler (BM), 7.VI.1982 3 ♂♂, 2 ♀♀ K. & E. Sattler (BM), 9.VI.1982 1 ♀ K. & E. Sattler (BM), 13.VI.1982 3 ♂♂, 2 ♀♀ K. & E. Sattler (BM), 21.VIII.1973 2 ♂♂ K. & E. Sattler (BM), Kaluapuhi Trail 5.IX.1973 1 ♀ K. & E. Sattler (BM), 9.VI.1982 1 ♀ K. & E. Sattler (BM). Kaunuohua Ridge 21.VII.1937 1 ♀ E. Zimmerman (BM), 1.VII.1982 2 ♀♀ K. & E. Sattler (BM), 2.IX.1973 1 ♀ K. & E. Sattler (BM), Kumuwella Ridge 23.VIII.1973 2 ♀♀ K. & E. Sattler (BM), 24.VI.1982 1 ♂, 4 ♀♀ K. & E. Sattler (BM), 1.VII.1982 2 ♀♀ K. & E. Sattler (BM). Kona IX.1896 1 ♀ Perkins *Nesomicromus vagus* Perk. TYPE 9014 (MCZ). Lihue Koloa F.R. 14.VII.1982 1 ♀ K. & E. Sattler (BM). Makaweli 2000 ft, V.1894 1 ♀ R. Perkins (BM). Na Pali, Kona Forest Res, Phiea Trail 15.VI.1982 1 ♀ K. & E. Sattler (BM), 21.VII.1982 2 ♂♂ 1 ♀ K. & E. Sattler (BM), 24.VII.1982 1 ♂ K. & E. Sattler (BM), Waialae Valley, Waialae Cabin 7.X.1973 1 ♂ K. & E. Sattler (BM). Waimea 1895 1 ♀ R. Perkins (BM), II.1897 1 ♀ R. Perkins (BM). Waimea Canyon State Park, Puu Hinahina many specimens collected during VIII-IX.1973 K. & E. Sattler (BM). LANAI: Koele Mt. 2000 ft, I.1894 1 ♂, 1 ♀ R. Perkins (BM), II.1894 1 ♂, R. Perkins (BM). Lanaihala 1.X.1976 1 ♀ K. & E. Sattler (BM). Munro Trail 2.X.1976 1 ♀ K. & E. Sattler (BM). MAUI: Haleakala 5000 ft, V.1896 1 ♂, 2 ♀♀ R. Perkins (BM), Haleakala 4000 ft, IV.1894 1 ♀ R. Perkins *Nesomicromus vagus* Perk. TYPE 9014 (MCZ), Kuapo Gap VI.1952 2 ♀♀ D.E. Hardy (BM), Kula 13.VII.1973 1 ♀ K. & E. Sattler (BM), 23.VII.1973 1 ♀ K. & E. Sattler (BM), Kula Pipe 4500 ft, 8.IV.1932 1 ♂ O. Bryant (BM). Makawao Forest Res. 21.VII.1973 1 ♂ K. & E. Sattler (BM), 29.VII.1973 1 ♀ K. & E. Sattler (BM). Paliku, Crater Maui VI.1952 3 ♀♀ D.E. Hardy (BM), VIII.1952 1 ♀ W.C. Mitchell (BM). Puna district, Volcano, 47 specimens collected IV-VI.1973 K. & E. Sattler (BM). MOLOKAI: Molokai Mts. 2000 ft, VI.1893 1 ♀ R. Perkins (BM), Molokai Mts 3000 ft, VI.1893 1 ♀ Perkins *Nesomicromus vagus* Perk. TYPE 9014 (MCZ), 1894 1 ♀ R. Perkins (BM), VI.1896 2 ♂♂ R. Perkins (BM). OHAU: Palola Mts. 24.III.1904 1 ♀ ex ovo, ovo 3.III.04, born 5.III, pupe 16-17.III.col.? (BM). Waianae Mt. IV.1892 4 ♂♂, 1 ♀ R. Perkins (BM), IV.1892 1 ♂ Perkins *Nesomicromus vagus* Perk. TYPE 9014 (MCZ), 4000 ft, VI.1894 1 ♀ *Nesomicromus vagus* Perk. TYPE 9014 (MCZ), 1 specimen without abdomen *Nesomicromus vagus* Perk. TYPE 9014 (MCZ), II.1896 1 ♀ R. Perkins (BM), V.1896 1 ♂ R. Perkins (BM).

Micromus variegatus (Fabricius, 1793)

A Palearctic species probably introduced into North America.

Material examined: FRANCE: Corse, Damry w.d. 2♀♀ McLachlan (BM). Haute Garone, Luchon 26.VI-13.VII.1933 1♀ M.E. Mosely (BM). Paris w.d. 2♀♀ McLachlan (BM). Pyrenées Orientales w.d. 1♂ McLachlan (BM), Ariège, Hospitalet 1420-1500 m, 7-25.VI.1950 1♂ K. Jordan (BM), Argeles, Taxo les Pins, several specimens collected in VI.1983 S. & A. Brooks (BM). Arles - Corsavy Road 19.V.1961 1♂, 1♀ D. & J. Clark (BM), GERMANY: 1-4.VI.1952 1♀ Zool. Excursion Eing (MH). Elbstrand, Neumühlen 3.VIII.1937 1♂ E. Feldtmann (MH). Hamburg w.d. 1♀ H. Weidner (MH), Bahrenfeld 31.VII.1952 1♂ F. Diehl (MH), Umgeg, v. Hamburg Rissen 4.IV.1958 1♀ J. Evers (MH), Wohldorfer 6.VI.1953 1♀ Wald (MH). Schau Slg. AltMus w.d. 2♂♂ W. Wüstnei (MH). ITALY: Aiona, Chiavari 1930 1♀ C. Mancini (MG). Casella, Valle Scrivia VII-IX.1934 1♂ C. Mancini (MG). Genova VII.1932 1♂ C. Mancini (MG). Lombardia, Como 29.VIII.1971 2♂♂ L.M. & B.R. Pitkin (BM). Orero, App. Ligure IX.1933 1♀ C. Mancini (MG). Biella, Piemonte, Piedicavallo VIII.1963 1♀ F. Capra (MG), Zumaglia 960 m, 30.VIII.1951 1♀ F. Capra (MG). Stazzano 19.IX.1979 1♂ D. Ferrari (MG). JAPAN: Karuizawa 30.VI.1959 1♀ P. Savolainen (MZH). SPAIN: Asturias, Auin 2.VIII.1989 1♀ A. Baz on *Corilus avellana* (VM). SWITZERLAND: Berne 27.VIII 1♀ McLachlan (BM). UNITED KINGDOM: Anglesey Is. 16.V.1962 1♂ on *Centaurea nigra* V.F. Eastop (BM). Surrey, Kew 25.VI.1972 1♀ on *Artemisa vulgaris* V.F. Eastop (BM), 23.VII.1972 1♂ on *Humulus lupulus* V.F. Eastop (BM). Water End, Hempstead, HT 18.V.1967 2♂♂, 1♀ on low herbage, H.L.G.S. (BM). USSR: Caucasus w.d. 1♂ J. Sahlb (MZH). YUGOSLAVIA: Slovenia, Kropa VI.1979 1♀ P.H. & S.L. Wards (BM).

Micromus variolosus Hagen, 1886

A western Nearctic species.

Material examined: MEXICO: N, Sonora w.d. 1♂, 3♀♀ Moorison (BM). UNITED STATES: Arizona, 5 mi W. Portal, SW Research Sta, Chiricahua Mts. 7.VII.1956 1♀ O. Cartwright (MZH), Flagstaff 5.VII 1♂ H.S. Barber (MZH), Pima Co, Sta. Catalina Mts., Molino Basin at Picnic area 4360 ft, 26.VII.1967 1♀ at light, R.C. Beard (BM). Colorado w.d. 1♂, 1♀ McLachlan (BM), Engla River 9.VI.1926 1♀ McLachlan (BM). New Mexico, Mesilla w.d. 1♀ Banks (BM). Utah, Eureka 13.VII 2♀♀ Spaldings (BM), Logan 24.VIII.1955 1♀ at light, G.F. Knowlton (MZH), 23.VIII.1957 1♀ at light, G.F. Knowlton (MZH), Snake Canyon, Provo 1.VIII 1♂ Spalding (BM).

ACKNOWLEDGMENTS

I wish to express my grateful thanks for the cooperation of many museum and institution curators who allowed me to examine or borrow material from their collections: P.C. Barnard and S. Brooks (BM), S.P. Cover (MCZ), K.M. Hoffman and J.C. Morse (CAS), R. Poggi (MG), A.Z.N. (MCH), H. Strümpel (MH), J. Van Tol (ML), F. Uribe (MZB), M. Meinander (MZH) and D. Simon (TU).

Also to H. Hölzel and S.K. Ghosh for their material and opinions and to M.W. Mansell for reading the English manuscript.

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SUMMARY

In this contribution new data on the taxonomy, morphology, biology and distribution of 46 species belonging to the genus *Micromus* Rambur, 1842 are given.

Lectotypes and paralectotypes are designated for *M. angustipennis* (Perkins, 1899), *M. australis* (Hagen, 1858), *M. bellulus* (Perkins, 1899), *M. calidus* Hagen, 1859, *M. igorotus* Banks, 1920, *M. linearis* (Hagen, 1858), *M. minimus* (Perkins, 1899) and *M. vagus* (Perkins, 1899).

Micromus australis (Hagen, 1858), *M. calidus* Hagen, 1859, *M. gratus* Banks, 1937, *M. igorotus* Banks, 1920, *M. linearis* (Hagen, 1858), *M. nigrifrons* Banks, 1937, *M. perelegans* Tjeder, 1937 and *M. placidus* Banks, 1937 are redescribed and the wings, male and/or female genitalia are described, figured and discussed.

Some new synonymies are proposed: *Micromus* Rambur, 1842 = *Mixomicromus* Ghosh, 1977 = *Memutus* Navás, 1932. *Micromus australis* (Hagen, 1858) = *Mixomicromus lampus* Ghosh, 1977. *Micromus calidus* Hagen, 1859 = *Eumicromus maculatipes* Nakahara, 1915 = *Micromus pictipes* Banks, 1920. *Micromus linearis* (Hagen, 1858) = *Micromus multipunctatus* Matsumura, 1907. *Micromus numerosus* Navás, 1910 = *Eumicromus confusus* Nakahara, 1964. *Micromus subanticus* (Walker, 1853) = *Micromus haitiensis* Smith, 1931.

New names are proposed for two homonyms: *Micromus vulcanius* n. nom. for *Nesothauma halaekalae* Perkins, 1899 and *Micromus minusculus* n. nom. for *Micromus minimus* Yang, 1988 nec Perkins, 1899.

Two new species are also described from Papua New Guinea and Indonesia.